LOAN COPY (2)

STATE OF NEW YORK
DEPARTMENT OF CONSERVATION
WATER RESOURCES COMMISSION

THE GROUND-WATER RESOURCES OF DELAWARE COUNTY, NEW YORK

By

JULIAN SOREN

Geologist, U. S. Geological Survey

Prepared by the
U. S. GEOLOGICAL SURVEY
in cooperation with the
NEW YORK WATER RESOURCES COMMISSION

BULLETIN GW-50

ALBANY, N. Y.

1963

STATE OF NEW YORK
DEPARTMENT OF CONSERVATION
WATER RESOURCES COMMISSION

THE GROUND-WATER RESOURCES OF DELAWARE COUNTY, NEW YORK

By

JULIAN SOREN

Geologist, U. S. Geological Survey

Prepared by the
U. S. GEOLOGICAL SURVEY
in cooperation with the
NEW YORK WATER RESOURCES COMMISSION

BULLETIN GW-50

ALBANY, N. Y.

1963

STATE OF NEW YORK
DEPARTMENT OF CONSERVATION
WATER RESOURCES COMMISSION

Harold G. Wilm.....Conservation Commissioner

J. Burch McMorran.....Superintendent of Public Works

Louis J. Lefkowitz.....Attorney General

Hollis S. Ingraham, M. D. .....Commissioner of Health

Don J. Wickham.....Commissioner of Agriculture and Markets

Keith S. McHugh.....Commissioner of Commerce

ADVISORY MEMBERS

David C. Knowlton.....Representing Industry

Harold J. Evans, Jr. .....Representing Agriculture

Robert E. Young.....Representing Sportsmen

Frank M. Dulan.....Representing Political Subdivisions

Robert A. Cook.....Secretary to the Commission

UNITED STATES

DEPARTMENT OF THE INTERIOR

Stewart L. Udall, Secretary

GEOLOGICAL SURVEY

Thomas B. Nolan.....Director

Luna B. Leopold.....Chief Hydraulic Engineer

O. Milton Hackett.....Chief, Ground Water Branch

Ralph C. Heath.....District Geologist

CONTENTS

	Page
Abstract	1
Introduction	2
Purpose and scope of investigation	2
Methods of investigation	3
Well-location system	4
Previous reports and investigations	4
Geography	5
Location and extent of area	5
Population and culture	5
Climate	6
Topography	6
Drainage	8
Geology	8
Stratigraphy	8
Devonian System	8
Upper Devonian Series	8
Quaternary System	9
Pleistocene Series	9
Till	9
Stratified deposits	12
Recent Series	12
Alluvium	12
Structure	13
Bedrock	13
Folds	13
Faults and joints	13
Bedding	14
Unconsolidated deposits	14
Geologic history	14
Ground water	15
Occurrence	15
Source	16
Fluctuations of ground-water levels	16
Availability	17
Bedrock	17
Stratified drift	18
Till	19
Utilization	20
Springs	20
Quality of water	20
Hardness	22
Iron and manganese	22
Chloride	25
Dissolved solids	25
Hydrogen sulfide	26
Temperature	26
Summary	26
References cited	28

ILLUSTRATIONS

Page

Plate 1. Map of Delaware County, New York, showing locations of wells and springs.....In pocket

2. Map of Delaware County, New York, showing areal distribution of principal unconsolidated deposits..In pocket

Figure 1. Map of New York showing location of Delaware County and status of ground-water investigations in upstate New York..... 3

2. Geologic sections through valleys of the East and West Branches of the Delaware River, in the vicinities of Cannonsville (A-A'), Fishs Eddy (B-B'), and Shinhopple (C-C'), Delaware County. (After Fluhr, 1953.)..... 10

3. Geologic sections through valley of the East Branch of the Delaware River, in the vicinities of Downsville (D-D') and the former village of Shavertown (E-E'), Delaware County. (After Fluhr, 1953.)..... 11

4. Geologic section through valley of Charlotte Creek, in the vicinity of Davenport Center, Delaware County. (From data provided by Corps of Engineers, U.S. Army.)..... 11

TABLES

		Page
Table 1.	Records of precipitation at Delhi, Delaware County, N.Y.	7
2.	Public water supply systems	21
3.	Chemical analyses of ground water	23
4.	Records of representative springs	30
5.	Records of representative wells	37
6.	Drillers' logs of selected wells and test holes	51

THE GROUND-WATER RESOURCES OF DELAWARE COUNTY, NEW YORK

By Julian Soren

ABSTRACT

Ground water is the principal source of water supply for a population of more than 44,000 in Delaware County, a topographically rugged area of 1,470 square miles in the Catskill Mountains of southeastern New York State. About 66 percent of the water used in the county is obtained from wells and springs; the rest is provided from streams. Public supply systems provide water to about 51 percent of the county's population.

The principal aquifers of the county are gently folded continental red, gray, and gray-green sandstones, siltstones, and shales of Late Devonian age and stratified drift of Pleistocene age. A very small amount of water is drawn from Pleistocene till and from Upper Devonian marine rocks which crop out in a small area in the northern and northwestern parts of the county. Most of the wells tap bedrock aquifers; the stratified drift, where coarse and saturated, is potentially a greater producer, but these deposits are relatively undeveloped in most of the county. Yields from bedrock wells reportedly range as high as 550 gpm (gallons per minute), although most are less than 50 gpm. Yields up to 1,000 gpm have been reported from wells in saturated, coarse stratified drift, and yields of more than 100 gpm are common from wells in such deposits. Yields from dug wells in till are generally a few hundred gallons per day. Much ground water discharges naturally from springs throughout the county, and many springs are utilized for individual and public supply systems. Reported spring yields of 5 to 10 gpm are common and others range upward to 100 gpm.

The ground water of Delaware County is usually soft, contains moderate to high concentrations of iron, and is usually low in dissolved solids. In a few areas of the county, the ground water is moderately hard to hard and has high chloride and dissolved-solids concentrations; hydrogen sulfide and natural gas also have been reported. These objectionable qualities are attributed to marine beds of the Middle Devonian and, perhaps, older marine units where these rocks are nearer the surface along low anticlinal crests and faults, and where faults and joints may provide paths for migration of water to the overlying strata from which the water is tapped.

There are no indications that the ground-water resources of the county are being depleted, and the supply is believed capable of considerably greater development, particularly from the thick deposits of stratified drift in the larger valleys.

INTRODUCTION

The study of the ground-water resources of Delaware County is part of a general investigation of these resources in New York being made by the U.S. Geological Survey in cooperation with the New York Water Resources Commission. Ground water is the principal source of supply for many homes, farms, businesses, and villages in the county.

Purpose and Scope of Investigation

The purpose of the investigation is to assemble and evaluate readily available information on the occurrence, availability, and chemical quality of ground water in the county to aid in the development and utilization of this vital natural resource and to provide a basis for further studies, if needed. An index map (fig. 1) shows the location of Delaware County and other counties or areas in New York, exclusive of Long Island, in which similar studies have been or are being made. A list of published reports is given on the back cover of this report.

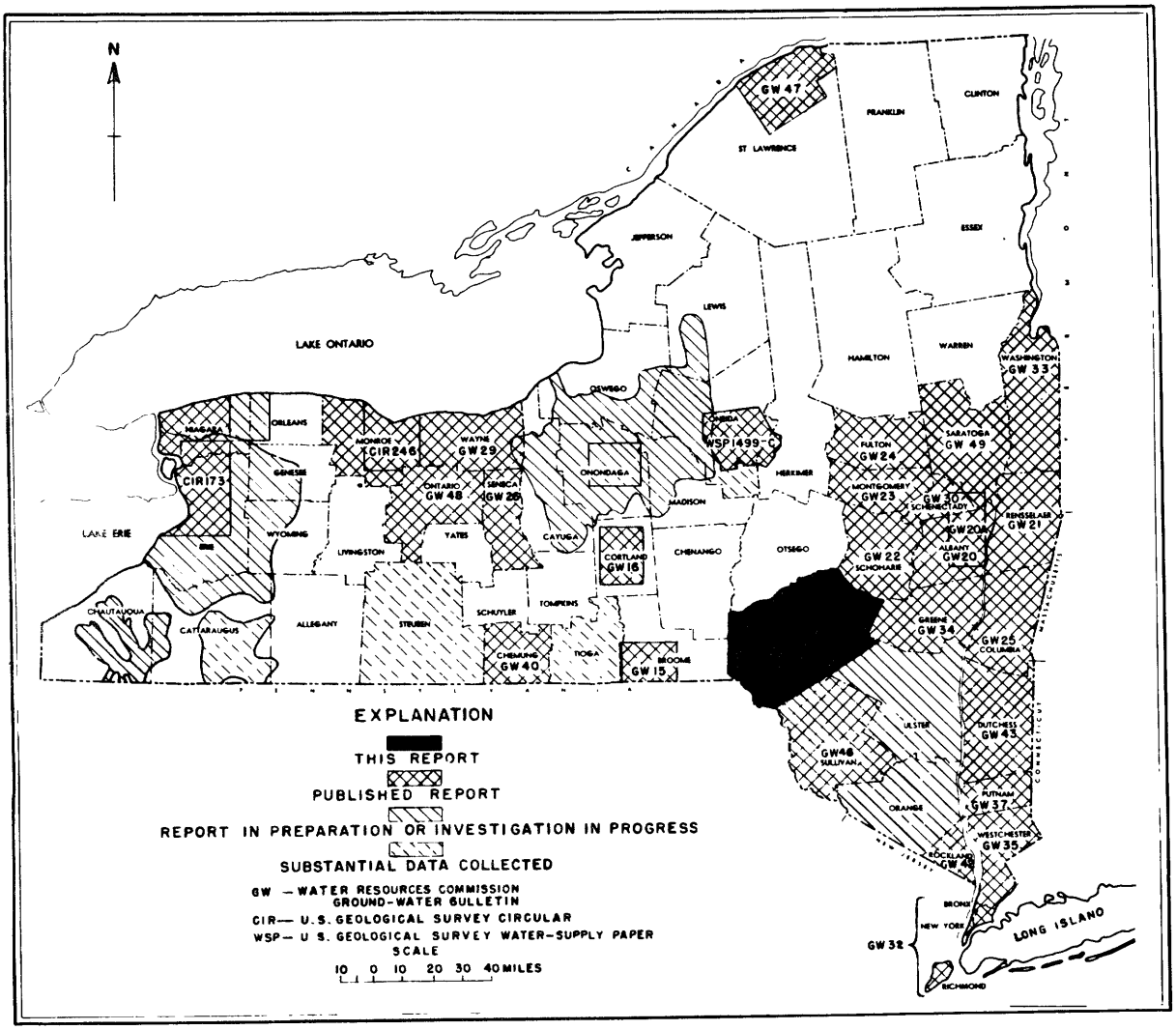

Figure 1.--Map of New York showing location of Delaware County and status of ground-water investigations in upstate New York.

Methods of Investigation

Most of the information on the occurrence and availability of ground water is based on records of more than 750 wells, springs, and test borings collected by personnel of the U.S. Geological Survey from well and spring owners and well drillers at various times from 1945 to 1948. Wells, test borings, and springs were numbered consecutively in the order visited, starting with D 1 for wells and test borings and D 1Sp for springs (the letter "D" designating Delaware County). Chemical analyses of water from a few wells were made by the U.S. Geological Survey, and records of other chemical analyses of ground water were obtained from the New York State Department of Health. The ground-water data are summarized in tables 2 to 6, inclusive. In many cases, well and spring data given in tables 4 and 5 were supplied from memory by owners and users. Well logs in table 6 are based on written records of the drillers. The section of this

report on the geology of the county is based in part on reconnaissance field mapping in 1948 by Jean M. Berdan and E. J. Lowry, U.S. Geological Survey.

This report was prepared under the direct supervision of Ralph C. Heath, district geologist of the New York ground-water investigation program of the U.S. Geological Survey, and under the general supervision of George C. Taylor, Jr., former district geologist, Mineola, N.Y.

The author gratefully acknowledges the assistance and cooperation of the many well drillers, business firms, property owners, and public officials who provided most of the well and spring data and subsurface information used in this report.

Well-Location System

The locations of wells, test borings, and springs listed in tables 4 and 5 of this report are shown on plate 1. As an aid in locating these features on maps of New York, meridians of longitude have been lettered consecutively from west to east at intervals of 15 minutes, beginning with "A" at long 79°45'W. and ending with "Z" at long 73°30'W. Similarly, parallels of latitude have been numbered at 15-minute intervals from north to south beginning with "1" at lat 45°00'N. and ending with "17" at lat 41°00'N. Delaware County lies between meridians "R" (long 75°30'W.) and "W" (long 74°15'W.) and between parallels "10" (lat 42°45'N.) and "14" (lat 41°45'N.). The grid system made by the meridians and parallels is shown on plates 1 and 2. Each well, test boring, and spring listed in tables 4 and 5 has a set of coordinates which gives its location in miles from a specific intersection of gridlines. For example, well D 21 has location coordinates 11T, 4.1S, 3.9E and is located 4.1 miles south and 3.9 miles east of the intersection of gridlines 11 and T; in like manner, well D 52 with coordinates 12V, 7.7N, 0.8W is located 7.7 miles north and 0.8 mile west of the intersection of lines 12 and V. All the wells, test borings, and springs shown in tables 4 and 5 can be readily located on plate 1, in this manner, by their location coordinates.

Previous Reports and Investigations

The geology of Delaware County is described briefly by Mather (1843), and the glacial geology of the northeastern and eastern parts of the county, by Rich (1935). Chadwick (1936) discusses some of the stratigraphy of the county. Geologic structures in the area are discussed briefly by Fluhr (1953) and Woodward (1957). A surficial geologic study of a large part of Delaware County was included in a general investigation of the hydrology and geology of the Delaware River basin (New York part) made in 1956 and 1957 by personnel under the supervision of N. M. Perlmutter of the U.S. Geological Survey, and part of the data obtained at that time are used in this report.

GEOGRAPHY

Location and Extent of Area

Delaware County comprises an area of 1,470 square miles in the southeastern part of New York, lying approximately between long 74°30'W. and long 75°30'W. and between lat 41°45'N. and lat 42°30'N. The county is bounded on the west by the counties of Broome and Chenango, on the north by the counties of Otsego and Schoharie, on the east by the Counties of Greene, Ulster, and Sullivan, and on the south by the Commonwealth of Pennsylvania (see fig. 1). Delaware County has been mapped in the following 15-minute quadrangles of the U.S. Geological Survey at a scale of 1:62,500 (1 inch equals approximately 1 mile): Andes, Cooperstown, Deposit, Delhi, Gilboa, Hobart, Livingston Manor, Long Eddy, Margaretville, Oneonta, Phoenicia, Richmondville, Starrucca, Unadilla, and Walton. Of these, the following quadrangles have been subdivided into four 7½-minute quadrangles each, at a scale of 1:24,000 (2.6 inches equal approximately 1 mile): Delhi, Gilboa, Hobart, Margaretville, Oneonta, Phoenicia, Richmondville, and Unadilla. Information concerning these maps may be obtained from the Map Information Service, Geological Survey, Washington 25, D.C.

Population and Culture

According to the U.S. Bureau of the Census (1961, p. 34-15) the population of Delaware County in 1960 was 43,540, a slight decrease from the 1950 population of 44,420. In 1960 the village of Sidney had the largest population, totaling 5,157; Walton was second in size with a population of 3,855; the village of Delhi, the county seat, was third with a count of 2,307.

Delaware County is primarily a rural area. Agriculture, mainly dairy farming, is the predominant type of employment. The Bureau of the Census (1957) shows about 32 percent of the population engaged in agriculture and about 19 percent in manufacturing in 1950 (p. 202). In 1954 there were 21 industrial establishments which employed 20 or more persons each (p. 207); smaller units were not enumerated. Seven of the listed plants were dairies, three produced lumber and wood products, two dealt in printing and publishing, two were engaged in the manufacture of furniture and home fixtures, and one each produced textiles, chemicals, stone, primary metals, fabricated metal products, electrical machinery, and miscellaneous items.

In 1954, the county had 2,776 farms of which there were 2,097 dairy farms, 140 poultry farms, 70 livestock farms (other than dairy and poultry), and 469 crop, general, and miscellaneous farms (Bureau of the Census, 1956, p. 56-57). In 1956, about 9,000 people were engaged in commerce and industry (Bureau of the Census and Bureau of Old-Age and Survivors Insurance, 1958, p. 76). The Scintilla Magneto Co., in Sidney, employed about 4,800 people in 1960 (written communication, Scintilla Magneto Co., 1960) and is the largest factory in the county. The occupational distribution in 1960 is probably similar to that described above because of the relatively stable population from 1950 to 1960.

The largest villages of the county are in the valleys of the major streams. The villages of Deposit, Margaretville, and Fleischmanns lie in the valley of the East Branch of the Delaware River; the villages of Hancock, Walton, Delhi, Hobart, and Stamford are in the valley of the West Branch of the Delaware River; Sidney lies in the valley of the Susquehanna River. Smaller communities also are situated in these valleys and in smaller valleys throughout the county.

The principal highways are New York 17, 23, and 28, which traverse the county from southeast to northwest, and New York 10 and 30, which run from southwest to northeast. Three railroads have lines in the county; the New York Central runs from Fleischmanns north to Stamford, thence generally west to Sidney; the Erie runs parallel to the Delaware River in the southwestern part of the county; and the Delaware and Hudson traverses the northwestern part of the county, through Sidney.

The Pepacton Reservoir occupies a large part of the valley of the East Branch of the Delaware River. A small part of the Schoharie Reservoir, near the village of Grand Gorge, also is in the county. A dam is now under construction near Cannonsville which will impound water in the West Branch of the Delaware River in a reservoir extending from that village eastward to Beerston. These reservoirs are parts of the water supply system for the City of New York.

Climate

Delaware County has a humid continental climate characterized by long, cold winters and short, warm summers. The average annual temperature is about 46°F, and the average annual precipitation is about 42 inches. The highest temperature ever recorded in the county was 101°F; the lowest was -33°F (Mordoff, 1949, p. 23, 46, 48, 50-52).

The growing season ranges from about 120 to about 150 days over the county, or from about the middle of May to about the end of September. The mean precipitation during the growing season is about 20 inches and the mean temperature during this period, about 63°F (Mordoff, p. 21, 22, 27, 50-52, 64-66). Table 1 shows the record of precipitation at Delhi from 1948 to 1959, and it appears to be relatively evenly distributed over the year.

Topography

According to Fenneman (1938), Delaware County lies almost entirely in the Catskill section of the Appalachian Plateau. The county has a rugged topography consisting generally of steep hills with narrow tops and separated by narrow valleys. Hilltop altitudes range from more than 3,000 feet in the north to about 2,000 feet in the southern and western parts of the county. The highest point in the county is on Bearpen Mountain, about 3,520 feet above sea level, 5½ miles south of Grand Gorge, on the boundary with Greene County. The lowest altitude is about 835 feet, at the Delaware River on the boundary with Sullivan County. Thus, the maximum relief of Delaware County is about 2,685 feet.

Table 1.--Records of precipitation at Delhi, Delaware County, N. Y.

Precipitation, in inches, at Delhi, Delaware County
(Source of data: U.S. Weather Bureau, 1949-60.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1948	2.25	2.33	4.26	5.14	5.36	6.00	4.28	2.06	0.73	2.76	4.00	5.14	44.31
1949	3.08	1.77	1.58	3.08	4.99	1.56	3.05	3.52	3.08	1.91	2.54	3.24	33.40
1950	4.28	4.48	3.39	3.17	2.62	4.60	4.08	5.08	3.40	1.41	4.67	4.41	45.59
1951	3.22	4.32	3.76	2.61	2.03	4.74	8.20	3.23	3.86	3.70	5.11	4.95	49.73
1952	2.86	2.80	3.36	3.61	3.62	2.01	5.98	2.96	1.74	1.25	2.35	5.24	37.78
1953	4.01	2.53	4.30	3.54	5.48	2.76	1.96	2.66	5.79	3.70	2.21	3.16	42.10
1954	2.75	3.10	2.77	3.92	3.93	4.26	2.14	5.00	3.11	2.76	6.02	3.43	43.19
1955	1.01	3.51	3.41	2.73	2.57	2.20	1.67	11.80	2.97	7.47	2.19	1.51	43.04
1956	1.90	4.03	4.73	4.38	2.38	4.10	5.11	2.96	6.35	1.76	2.83	4.36	44.89
1957	2.27	1.48	1.78	4.12	4.73	3.11	4.05	1.37	1.70	2.02	2.31	5.06	34.00
1958	3.97	3.88	2.78	3.44	4.30	4.64	5.44	3.15	4.42	5.07	3.95	1.05	46.09
1959	3.09	2.02	2.84	3.70	1.07	2.62	2.28	4.98	3.35	6.19	6.70	3.57	42.41
	Maximum, minimum, and average precipitation, in inches, for period of record												Average Annual
Maximum	4.28	4.48	4.73	5.14	5.48	6.00	8.20	11.80	6.35	7.47	6.70	5.24	
Minimum	1.01	1.48	1.58	2.61	1.07	1.56	1.67	1.37	0.73	1.25	2.19	1.05	
Average	2.89	3.02	3.25	3.62	3.59	3.55	4.02	4.06	3.38	3.33	3.74	3.76	42.21

The mountainous aspect of the county is due principally to erosion of rock strata by streams since the end of the Paleozoic Era, about 220 million years ago.

The widest valleys in the county are along the major streams: the East Branch of the Delaware River, West Branch of the Delaware River, the Susquehanna River, and Ouleout and Charlotte Creeks. The flood plains in these valleys range in width from a tenth to generally not more than half a mile. The widest valley floor in the county is at Walton where, for a short distance, the valley of the West Branch of the Delaware River attains a width of about a mile.

Drainage

Most of the county lies in the Delaware River drainage basin; about one-fifth of the county is in the Susquehanna River basin; a very small portion of the county (less than 2 percent) at the eastern edge lies in the Hudson River basin (see pl. 2). Delaware County is generally well drained; there are relatively few swamps and large natural lakes. The few swamps and natural lakes in the high parts of the county are probably the results of local damming of natural drainage systems by moraines laid down in Pleistocene time; many of the larger lakes are manmade.

GEOLOGY

Stratigraphy

Delaware County is underlain by consolidated sedimentary bedrock of Late Devonian age which is generally covered by a mantle of unconsolidated Quaternary deposits, mostly of Pleistocene age. The areal extent of the principal unconsolidated deposits is shown on plate 2.

Devonian System

Upper Devonian Series

The Upper Devonian rocks in the county consist of three distinct lithologic types: a basal unit of marine origin, consisting of grayish-brown sandstones and siltstones, an overlying unit of interbedded continental red, gray, and gray-green sandstones, siltstones, and shales, and a tongue of interbedded gray marine shale and siltstones within the continental unit.

The basal unit crops out in a small area in the northern part of the county, in the vicinity of Charlotte Creek, and is believed to be correlative with the Gilboa Formation (Cooper and Williams, 1935, p. 818-821) in Schoharie County, where the formation is about 325 feet thick. Similar strata, about 1,000 feet thick, were observed in the eastern part of Sullivan County, in the west side of the Port Jervis Trough (Soren, 1961, p. 15). The basal marine unit in Delaware County is underlain by Middle Devonian marine rocks of the Hamilton Group and is overlain by undifferentiated Upper Devonian rocks of continental origin. The lower and upper contacts of the unit appear to be conformable. Hamilton Group rocks do not crop out in Delaware County, but they are observed at the surface in adjacent counties to the north and east.

The uppermost bedrock in most of Delaware County comprises interbedded continental red, gray, and gray-green sandstones, siltstones, and shales. The thickness of red strata increases toward the northeastern part of the county. Crossbedding is a common feature in exposures of the sandstones in this unit. The thickness of continental rocks increases southwestward and probably reaches several thousand feet in the vicinity of the Delaware River, near Pennsylvania.

A tongue of marine rocks, consisting of gray shales, which weather in some places to a dark purplish color, and gray siltstones occurs within the continental strata. This unit was named the Kattel Shale by Chadwick (1932, p. 7). Outcroppings of the Kattel Shale were observed in the northwestern part of the county in the valley of Big Brook on New York Highway 8, south of Sidney, and along the road about a mile south of Bartlett Hollow. The Kattel Shale in Delaware County is estimated to be between 100 and 200 feet thick from Bartlett Hollow to Sidney Center and it apparently wedges out eastward in the vicinity of Arctic Creamery (although Chadwick believed this unit to extend eastward as far as Delhi, it was not observed east of Arctic Creamery by the author). South of Big Brook valley, Kattel beds, if present, are covered by continental Upper Devonian strata.

The contacts of the Upper Devonian units were not mapped in Delaware County, and all the exposed bedrock is therefore simply referred to as Upper Devonian rocks in this report.

Upper Devonian rocks form the most extensive aquifer in the county and are widely used as a source of ground-water supply. Wells tapping the bedrock have been reported to yield as much as 550 gpm (though such high yields are questionable), and springs issuing from bedrock have been reported to yield as much as 100 gpm.

Quaternary System

Unconsolidated Quaternary deposits of Pleistocene and Recent age cover most of the bedrock in Delaware County. These deposits range in thickness from fractions of an inch to as much as 212 feet. The Pleistocene mantle consists of till and stratified deposits of clay, sand, and gravel. Recent deposits consist mostly of a few feet of fine sand, silt, and clay on flood plains. The areal distribution of unconsolidated deposits in the county is shown on plate 2. Thicknesses of unconsolidated deposits in some of the valleys are shown on figures 2, 3, and 4.

Pleistocene Series

Till.--Till is a glacial deposit consisting generally of an unstratified and unsorted mixture of rock fragments ranging in size from clay to large boulders, wherein the relative proportions of clay and boulders are highly variable from place to place. Most of Delaware County is mantled by deposits of till whose thickness varies greatly over the county, usually being greatest in valleys and on the lower slopes of hillsides, and least on the hilltops. The greatest reported thickness of till in the wells listed in table 5 is 140 feet (D 406). Fluhr (1953, p. 137, 139) shows a thickness of more than 200 feet of till on the south side of the valley of the East Branch of the

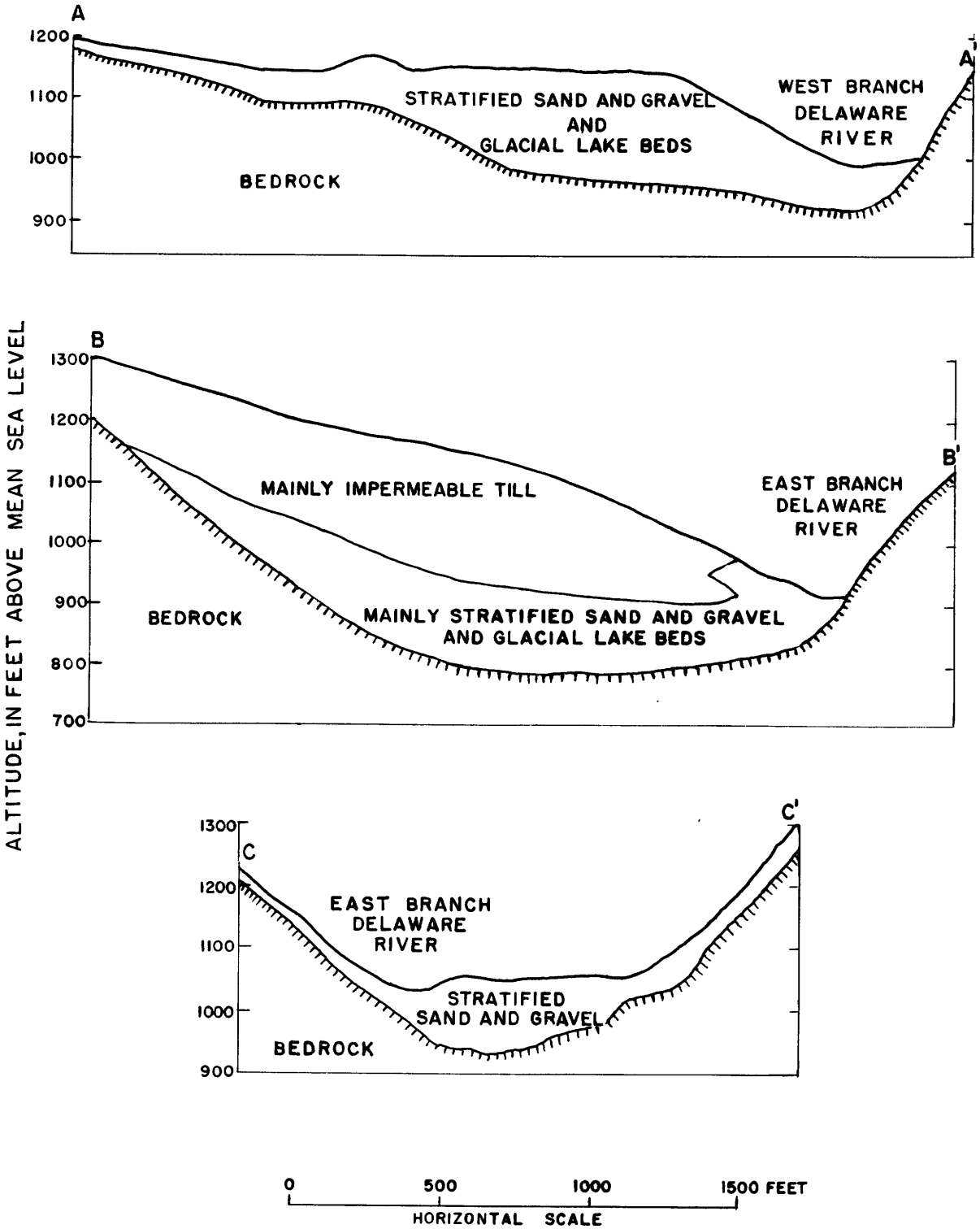

Figure 2.--Geologic sections through valleys of the East and West Branches of the Delaware River, in the vicinities of Cannonsville (A-A'), Fishs Eddy (B-B'), and Shinhopple (C-C'), Delaware County. (After Fluhr, 1953.) Sections are oriented as though viewed looking upstream; locations of sections are shown on plate 2.

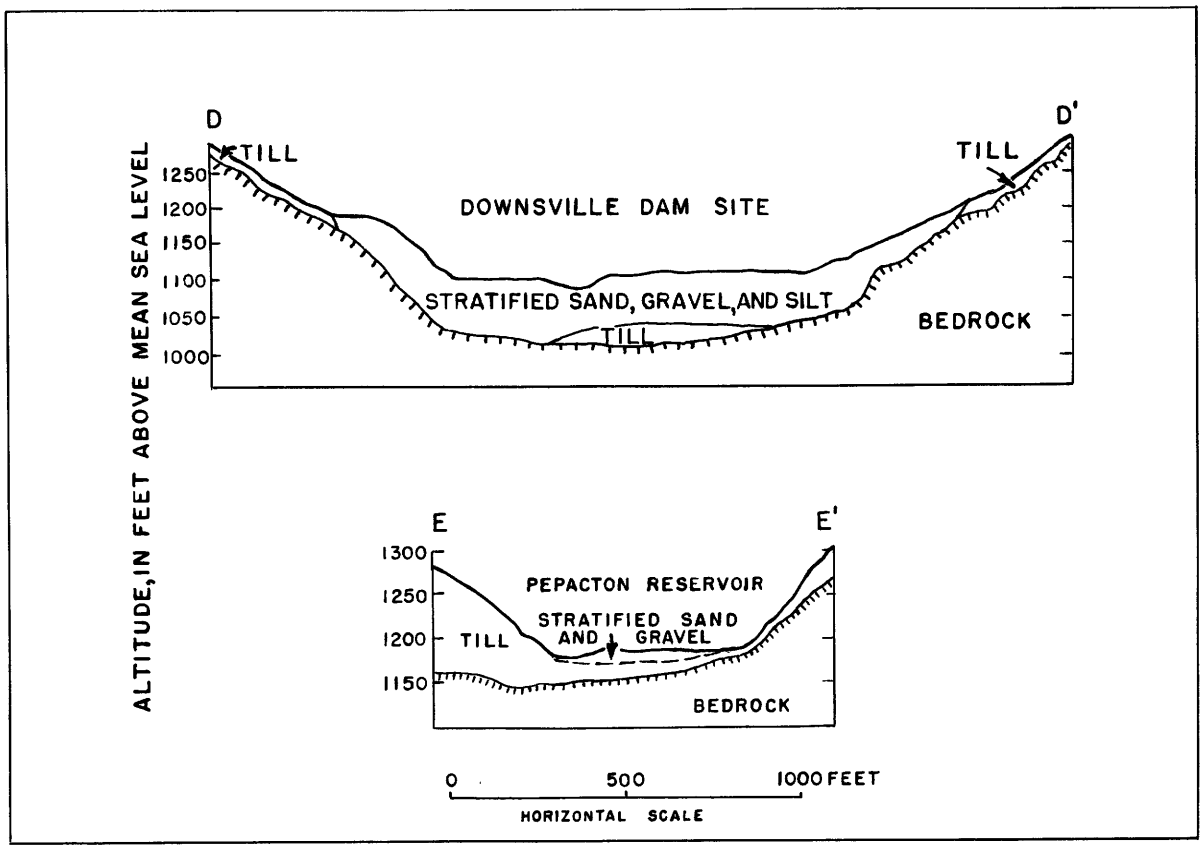

Figure 3.--Geologic sections through valley of the East Branch of the Delaware River, in the vicinities of Downsville (D-D') and the former village of Shavertown (E-E'), Delaware County. (After Fluhr, 1953.) Sections are oriented as though viewed looking upstream; locations of sections are shown on plate 2.

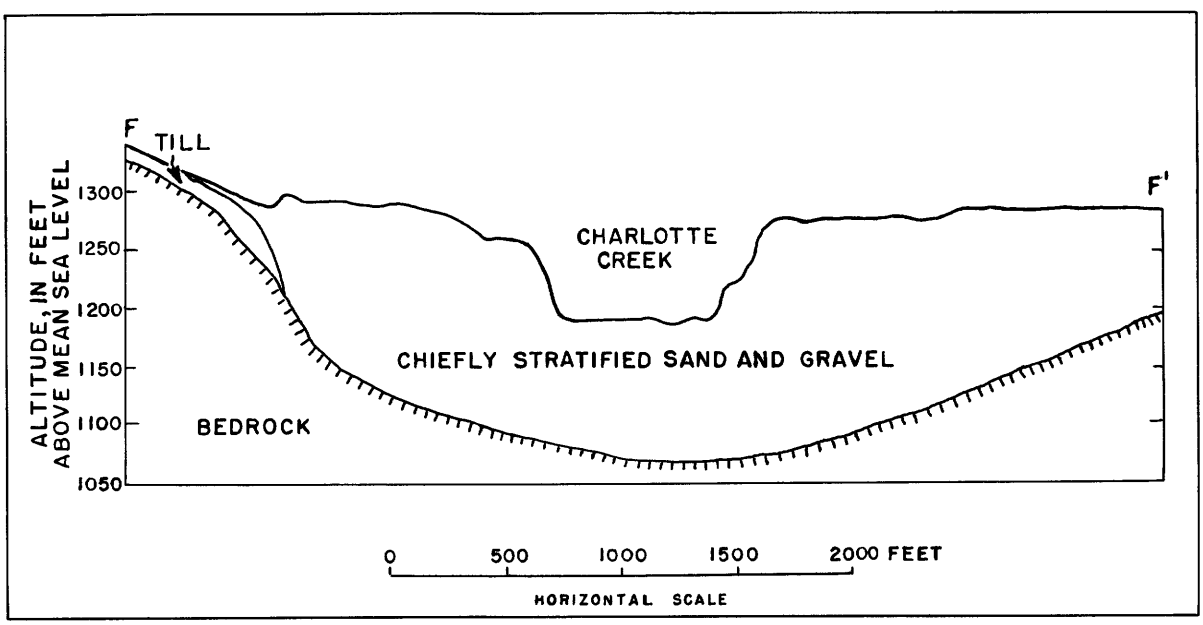

Figure 4.--Geologic section through valley of Charlotte Creek, in the vicinity of Davenport Center, Delaware County. (From data provided by Corps of Engineers, U.S. Army.) Section is oriented as though viewed looking upstream; location of section is shown on plate 2.

Delaware River, at the site of the Shavertown Bridge where New York State Highway 30 crosses the Pepacton Reservoir (see fig. 3, sec. E-E'), and a thickness of about 100 feet of till overlying stratified deposits on the north side of the valley of the East Branch of the Delaware River at Fishs Eddy (see fig. 2, sec. B-B'). Most of the till in the county appears to have been laid down as lodgment till directly by the ice sheet that invaded the area from the north in Pleistocene time. The remainder is ablation till deposited when the ice melted. Lodgment till may be extremely compact and hard; such till is usually called "hardpan" by well drillers in the area. Ablation till is relatively loose material, as it simply was dropped onto the underlying ground when the ice melted.

Many of the shallow dug wells in the county are in till. Such wells generally yield not more than a few hundred gallons of water per day. Wells that penetrate saturated lenses of sand incorporated in the till are capable of greater yields.

Stratified deposits.--Stratified deposits of gravel, sand, silt, and clay, also called stratified drift, were laid down to a varying thickness in most of the valleys in the county by glacial melt-water streams during the Pleistocene Epoch. Cross sections of some of the valley-fill deposits are shown on figures 2, 3, and 4. Lakes existed at times when valleys were dammed by rock debris or ice blocks. Deltas of sand and gravel were built into the lakes where streams entered them and silt and clay were deposited in deeper portions. Interfingering of deltaic and lake deposits are common, probably as a result of changing lake levels by variations in streamflow and changes in the heights of the dam. The greatest thickness of stratified drift in the county appears to be in the valley of the Delaware River at Hancock where bedrock reportedly lies 212 feet below the land surface. (See table 5, well D 121.)

Thick deposits of saturated, coarse stratified drift can yield large quantities of water because of their high permeability. Yields of hundreds of gallons per minute are not uncommon from properly constructed wells in these deposits. Yields of 1,000 gpm were reported for wells D 1 and D 2 (see table 5); however, the duration of yield at this rate and the drawdown in the wells are not known.

Recent Series

Alluvium.--Recent deposits in the county consist mainly of alluvium deposited by streams on flood plains. These deposits consist chiefly of silt and fine sand with small amounts of coarse sand and fine gravel. The deposits are generally thin, most of them probably less than 5 feet thick. In many places, Recent alluvium has been deposited on Pleistocene stratified deposits, and it may not be possible to distinguish the contact because of the similarity of the beds; therefore, Recent deposits are included with Pleistocene deposits on plate 2.

Recent alluvium is not an important source of ground water in the county because of its small areal extent, thinness, and fine-grained character.

Structure

Bedrock

Folds

The rocks in Delaware County lie in broad, low folds, trending in a northeasterly direction, in a larger synclinal structure whose trough plunges gently southwestward and appears to lie within the county. Woodward (1957, p. 1432-1434) observed low folds along the Delaware River between Hancock and Port Jervis (Orange County), and he stated that the East and West Branches of the Delaware River lie along low anticlines and that a syncline occupies the intervening high area. Anticlinal crests in these valleys were observed by the author in outcrops along New York Highway 10 north of Apex, along Highways 206 and 30 in the vicinity of the Pepacton Reservoir, and in the West Branch of the Delaware River in the vicinity of Delhi. According to Woodward, the axes of folding trend N.75°-80° E. and appear to extend across the county. The limbs of the folds dip at low angles, generally less than 5°, to the southeast and northwest. The steepest dips observed by the author were at outcrops at Delhi, in the bed of Steele Brook, where gray shale beds dip about 12°NW. and on New York State Highway 10, north of the village of Apex, where an anticlinal crest is exposed. The limbs of the anticline dip about 8° and 5° to the northwest and southeast, respectively. Woodward (1957, p. 1436) states that the Lackawanna syncline (a folded and faulted synclinorium which contains the Northern anthracite field of Pennsylvania) crosses into Delaware County at Stockport, about 5 miles south of the village of Hancock. It appears that axes of folds in the Ridge and Valley province (Fenneman, 1938, p. 195) extend into Delaware County from Pennsylvania. However, the intensity of folding is greatly diminished, and the county has the appearance of a maturely dissected plateau.

Folds affect the occurrence and movement of ground water. Inclination of strata in the limbs of folds and along the plunge of the folds can cause artesian pressure in rocks lying between beds of less permeability. Beds of less permeability also can serve as barriers to movement of ground water between adjacent folds. Since rock units of different chemical composition may be involved in the folding, differences in quality of ground water can occur from place to place, as the various rocks are deeper or nearer the land surface in different folds and parts of folds.

Faults and joints

Evidence of faults is not commonly seen at the surface in Delaware County because of the lack of marker beds and scarcity of extensive rock outcrops. A thrust fault with a displacement of a few feet was observed in the anticlinal fold on New York Highway 10 north of Apex, described in the preceding paragraphs. The fault has a northwesterly dip of about 15°. Fluhr (1953, p. 133) mentions a fault encountered in the construction of the Downsville Dam (Pepacton Reservoir), and that other faults were transected by the East Delaware Tunnel (which connects the Pepacton Reservoir with Rondout Reservoir, in Sullivan County); he states (p. 127) that most of the faults are normal or tension faults.

The bedrock of the county is strongly jointed, and sets of closely spaced joints in shales and joints several feet apart in the thicker sandstones are commonly observed in outcrops. Joint sets striking northeast and northwest are predominant in the county. Planes of jointing are generally perpendicular or nearly perpendicular to the bedding of the strata.

Faults and joints are important structures which give a secondary porosity to the bedrock. The degree of opening of these fractures and their interconnection greatly determine the permeability of the bedrock. Wells in fractured rocks with open faults and joints have higher yields than wells in little-fractured rocks or in rocks with tight fractures or fractures "healed" by secondary mineral deposits.

Bedding

The rocks of Delaware County show the typical primary layered structure of sedimentary rocks. The strata range from shaly layers (up to 3/8 inch thick) in the shales to massive (more than 4 inches thick) in the sandstones; however, flaggy bedding (from 3/8 inch to 4 inches thick) is generally observed in the sandstones. Flaggy crossbedding is a common feature in the continental sandstones.

Openings along bedding planes of the strata are important features of secondary porosity, as are fractures which intersect the bedding, and the degree of openness or tightness of these features is an important factor affecting the permeability and storage capacity of the bedrock.

Unconsolidated Deposits

Unconsolidated stratified deposits of well-sorted sand and gravel are more porous and permeable than bedrock, and bedding, folds, and faults resulting from compaction or slumping of the sediments have a negligible effect on movement and storage of ground water. Where the deposits are not well sorted, a lessening of porosity and permeability would accompany compaction. Included beds of clay and silt and till deposits decrease the vertical permeability of the deposits.

Geologic History

The formation of the rocks now exposed in Delaware County, as interpreted from Schuchert and Dunbar (1947) began with the deposition of the Gilboa Formation strata as silt and sand in a shallow sea which covered the county in Late Devonian time. The source of the sediments was a highland to the east. Toward the end of the Devonian Period, the Acadian orogeny uplifted the eastern highlands, and the sea essentially withdrew from the area. Coarse sand, silt, and clay were carried into the region by streams from the east and a vast delta was formed, extending across southern New York and through Pennsylvania. This feature is known as the Catskill delta and is represented by the nonmarine red, gray-green, and gray sandstones, conglomerates, and shales of the county. An advance of the sea eastward across the county to about the vicinity of Arctic

Creamery provided the environment for the deposition of the Kattel Shale of Chadwick (1932). This portion of the sea was relatively short-lived in the county as seen by the small thickness of these beds, and after its withdrawal from the county, continental deposition continued in the region through Devonian time.

Near the end of the Paleozoic Era the region was elevated and the rocks gently folded by the Appalachian Revolution, which built a mountain range to the east of the county, extending southward through Alabama. A long period of erosion followed the Appalachian orogeny, during which any strata younger than Devonian, and much of the Upper Devonian rocks, were removed. Erosion apparently has been more or less continuous from late Paleozoic time to the present, for comparatively brief periods of deposition in the Quaternary Period.

During the Pleistocene Epoch, Delaware County was covered by a continental glacier which advanced over the area from the north. A record of only one glaciation is apparent in Delaware County. The ice front may have advanced and retreated more than once, but any evidence of such glaciation is obscured or destroyed by the last glaciation (Wisconsin Stage). Glaciation was an agent of both erosion and deposition. During the ice advance, most of the soil mantle was removed and redeposited, blocks of bedrock were plucked away from outcroppings, and valleys, oriented with the direction of ice movement (northeast-southwest), may have been deepened by glacial scouring. In many places, clay, rock flour, stones, and boulders at the bottom of the moving ice were plastered onto the underlying ground as lodgment till. As the ice melted, streams deposited beds of gravel, sand, silt, and clay in valleys and lakes, and ablation till was deposited over wide areas.

In the Recent Epoch, alluvium has been deposited on the flood plains of valleys. Erosion continues in the rest of the county.

GROUND WATER

Occurrence

Ground water is subsurface water that is in the zone of saturation, the zone in which all interconnected openings are filled with water. The zone between the land surface and the zone of saturation is known as the zone of aeration. The upper surface of the saturated zone is commonly referred to as the water table except where this upper surface is formed by an impermeable body. The water table is generally a subdued version of the topography, being at higher altitudes under hills than in valleys; however, the depth to the water table from the land surface is generally greatest on hilltops and least in valleys. Ground water in varying amounts is usually recoverable from the bedrock and the unconsolidated deposits of the county.

Ground water occurs under both water-table and artesian conditions in Delaware County. Most of the deep bedrock wells probably have artesian characteristics, because of the arrangement of fractures and bedding, and because of intercalated rock strata of low secondary porosity and permeability which may serve locally as confining beds. Water-table conditions are believed to exist more widely in the unconsolidated deposits; however, clay beds and till

may confine water locally in deposits of sand and gravel. Wells listed in table 5 that are reported to flow or to have flowed at some time are examples of artesian wells.

The water-table aquifer and many artesian aquifers intersect the land surface on most hillsides in the county, and numerous springs and seeps occur throughout the area.

Source

The source of ground water in the county appears to be solely precipitation on the area, and only a small part of the precipitation reaches the zone of saturation. Most of it is lost by runoff to streams or is returned to the atmosphere by evaporation and plant transpiration. The amount of water that enters the ground is controlled by the amount and intensity of precipitation, slope of the land, amount and types of vegetation, permeability and porosity of the surficial cover, and thickness and character of the zone of aeration. Precipitation at a slow constant rate will infiltrate to the water table more readily than intense precipitation during short periods. Steep slopes are conducive to rapid runoff, especially where the land surface is relatively impermeable; however, an extensive cover of vegetation tends to retard runoff.

The water which penetrates the land surface and which is not transpired by plants moves downward through the zone of aeration, chiefly by gravity and to some degree by capillary attraction, toward the zone of saturation. Before water can enter the zone of saturation, all the surfaces of the spaces traversed by infiltrating water must be wetted to satisfy the molecular attaction between the surfaces and the water.

Fluctuations of Ground-Water Levels

Ground water moves under the influence of gravity toward areas of discharge. Ground water discharges as springs where the water table intersects the land surface, usually on hillsides, and most of the streams in the county originate as springs. Ground water also enters streams by seepage along the bottoms and sides, contributing greatly to stream discharge in all seasons and is the sole source of base flow of perennial streams during drought.

The position of the water table is constantly changing in response to variations in recharge and discharge. When discharge exceeds recharge, ground-water levels decline; conversely, when recharge exceeds discharge, the levels rise. Fluctuation of ground-water levels is readily seen in wells.

In a region such as Delaware County, periods of greatest recharge usually occur in late autumn and from late winter to early spring. In late autumn, fewer hours of sunshine and the accompanying colder weather greatly reduce evaporation and transpiration losses. In midwinter much precipitation is retained on the surface as snow, and the frozen ground tends to keep water from infiltrating to the water table, except during brief thawing periods. From late winter to early spring, slowly melting snow provides the principal ground-water recharge. Ground-water levels are lowest during the summer, because of large evapotranspiration losses.

Availability

Ground water is generally available in Delaware County to supply small to moderate needs. Few people have experienced difficulty in obtaining sufficient water for domestic needs from wells of moderate depth. Many springs are used for domestic and public supply, most of which are reported to have been reliable over many years of use. Plate I shows the distribution of wells and springs for which data are included in this report (tables 3-6).

It is believed, from the small amount of ground water used in the county, the amount of precipitation recorded, and the widespread spring discharge observed in the area, that the aquifers of the county are capable of supporting greater development; however, local ground-water shortages could occur as a result of large withdrawals, unfavorable geologic conditions affecting recharge, drought, or combinations of these circumstances.

Ground water is recovered from wells and springs in three geologic units in the county: bedrock, stratified drift, and till. The distribution of water wells (listed in table 5) in these water-bearing units is as follows: bedrock, 237; stratified drift, 101; till, 16; and unknown, 4. Most of the springs listed in table 4 issue from bedrock.

Bedrock

Upper Devonian bedrock is the most widespread water-bearing unit in Delaware County. It underlies the entire county and is found at the surface in outcrops and at depths of as much as 212 feet beneath unconsolidated deposits. The bedrock is a complex hydraulic unit, which is considered here as a single aquifer because of lack of data about interconnections between the stratigraphic units. Most of the wells and springs drawing from the bedrock are in strata of the continental phase of the sequence. No water wells in Delaware County are known to penetrate strata older than Late Devonian. The older rocks are generally at too great a depth for practical well drilling. Older rocks may have been brought near the surface in the vicnity of anticlinal crests and faults; such may be the case where wells are reported to yield water of considerable hardness, salinity, hydrogen sulfide content ("sulfur water"), and natural gas (see "Quality of Water"). These constituents are more characteristic of the older marine rocks which contain calcium, magnesium, pyrite, and disseminated matter of organic origin.

The yields of the wells in bedrock (listed in table 5) range from 1 to 550 gpm (gallons per minute). Wells in this group for which drawdown data have been reported show specific capacities of 0.01 to 22.6 gpm per foot of drawdown. The duration of pumping of many of these wells is not known, but of many other wells was generally less than an hour. The longest pumping test of a bedrock well that is known was made on well D 487 (see table 5); this well reportedly was pumped at 360 gpm for 60 hours during which the water level was drawn down 49 feet, giving a specific capacity of 7.3 gpm per foot of drawdown. In most installations, bedrock wells are cased from the land surface to the top of the rock, or to a few feet in the rock, and are finished with open holes for the remainder of their depths. The penetrations into bedrock of the water wells

listed in table 5 range from 4 feet to 685 feet; penetrations of more than 100 feet are common.

Table 5 shows 15 wells in bedrock (D 33, 38, 56, 67, 88, 91, 102, 103, 121, 156, 227, 272, 353, 420, and 487) to have reported yields of 100 gpm to 550 gpm. All these wells are situated in stream valleys, and nearly all penetrate more than 50 feet of mostly stratified unconsolidated deposits before entering the bedrock. Lack of data on the construction of the wells leaves doubt as to whether the high yields are representative of the bedrock or are due to leakage into the well from the overburden where the casings make contact with the bedrock, or to structural features such as open faults, joints, and bedding which effect good hydraulic continuity between permeable saturated deposits and the wells.

The yield of a well tapping bedrock depends on the number and size of fractures and other interstices in the rock intersected by the well. Bedrock which is thinly bedded and well fractured is more permeable than massive, unfractured bedrock and is therefore capable of greater yield. Permeability due to fracturing can be quite high. Fluhr (1953, p. 136) reports an estimated inflow of 600 gpm of ground water for an unspecified period into a water tunnel of the New York City supply system when it was driven through a fault zone near the Neversink River, in Sullivan County. The flow was sealed off by grouting. The possibility of high yield from a bedrock well intersecting open faults in hydraulic contact with a stream cannot be predicted without extensive knowledge of these features. Such geologic data are not available for Delaware County, but it is believed that large yields from bedrock wells under such conditions would not be common in the county.

The bedrock of Delaware County generally has shaly to flaggy bedding and is broken along numerous joints and faults. The bedrock in most cases will yield sufficient water to satisfy domestic and small commercial needs.

Stratified Drift

Saturated stratified drift composed of coarse sand and gravel beds is capable of yielding large amounts of ground water. Many of the valleys in Delaware County contain thin to thick deposits of stratified drift which have not been fully investigated. The areal extent of these deposits is shown on plate 2. It has been noted inthe county that valleys with flat floors generally contain these deposits, and that valleys trending approximately north-south generally contain thicker deposits than valleys trending east-west. The Pleistocene ice sheet apparently was able to scour valleys oriented in its path of travel, providing good channels for deposition of outwash when the ice melted. East-west-oriented valleys received much lodgment till as the ice crossed them.

Thick deposits of stratified unconsolidated deposits are found in many of the valleys, but in many places they contain interbedded clay and silt. Valley fill of mainly stratified drift in thicknesses of more than 200 feet occurs in parts of the Delaware River valley and Beaver Kill valley. Thicknesses of stratified drift exceeding 100 feet are found in parts of the valleys of the Delaware River, East and West Branches of the Delaware River, Beaver Kill,

Susquehanna River, Charlotte Creek, and Ouleout Creek. Valley fill more than 50 feet thick containing deposits of stratified drift occurs in many of the smaller tributary valleys of the county; many of these smaller valleys have floors less than one-tenth of a mile wide.

Deposits of stratified drift in the county are tapped by drilled wells equipped with screens or with slotted or open-end casings and by small-diameter driven wells equipped with screened drive points. The only drilled well known to be screened, of those listed in table 5, is D 76. Most of the drilled wells tapping stratified drift are believed to have slotted casings. The small-diameter driven wells are usually screened with 3-foot drive points. Screened wells are generally most effective for obtaining large yields from stratified drift.

Many of the wells in the valleys are cased through stratified drift and tap the underlying bedrock. This may be due to the thinness or fine-grained character of the deposits at the site, or to a lack of the specialized equipment and experience needed by the driller for proper construction and development of wells in such material.

The reported yields of wells that tap stratified drift range from 2 to 1,000 gpm (see table 5). Wells in this group for which drawdown data have been reported show specific capacities of about 1 to about 32 gpm per foot of drawdown, which is the highest for water-bearing units in the county. However, the specific capacities shown for many wells are probably too high, because the wells were not pumped for a sufficient time to develop a stabilized drawdown. It is not known if drawdown stability was attained in any of these wells.

Till

Till is the most widespread unconsolidated deposit in the county, covering most of the bedrock with a thickness of a fraction of an inch to as much as 200 feet. It is the least productive aquifer in the county because of its low permeability. Water in usable quantities can generally be obtained only from large-diameter dug wells, which provide a large infiltration area and a large storage volume for water between periods of use. Dug wells are generally practical only where the water table is close to the surface as on hillsides and in valleys. They are generally impractical on hilltops because the till cover is usually too thin to retain a zone of saturation.

Dug wells are highly susceptible to contamination, and as most such wells penetrate only a few feet below the water table, many go dry or fail to yield adequate amounts of water during dry seasons. No reliable records of yields of dug wells in Delaware County are available. The owners of these wells report them as "adequate" or "inadequate." As most dug wells in till do not yield more than a few hundred gallons per day, less than is now required by most households, the use of such wells in Delaware County is generally declining.

Utilization

Most of the water used in Delaware County is taken from ground-water sources. About 49 percent of the population obtains water from privately owned wells and springs. The remainder of the population, about 23,000, chiefly concentrated in the larger villages, is supplied by 31 public water systems. Seventeen public water systems use only ground water, seven use only surface water, and seven use both ground water and surface water in undetermined proportions. Data on public water systems are listed in table 2.

It is estimated that an average of about 3.5 mgd (million gallons per day) is produced from ground-water sources; the remainder of the total estimated use of 5 mgd is supplied from surface sources. The estimates are based on a per capita usage of 100 gpd from private supplies and the daily consumption of water from public supply systems listed in table 2. Where a public supply system is shown to use both ground water and surface water, it is estimated that half the total is obtained from each source.

There is no greatly increased population in Delaware County in the summer, such as occurs in neighboring Sullivan County, and summer ground-water withdrawals are probably not appreciably higher than for a normal summer in a population-stable area, except perhaps in the vicinities of Fleischmanns and Margaretville, and to a lesser extent in Stamford and Downsville, which receive most of the summer-vacation trade in the county. No accurate statistics of summer visitors have been kept; however, it is reported that approximately 5,000 people vacation in the Fleischmanns-Margaretville area during the summer months (Chambers of Commerce, Margaretville and Fleischmanns, 1960, written communication).

Springs

Many springs in the county have been developed for water supplies, principally for domestic and farm uses and, in some places, for public supplies. Data on selected springs in the county are given in table 4. Many of the springs listed have yielded reliable supplies for long periods of time, some as much as 100 gpm, although most of them are reported to have much smaller yields. Yields of 5 to 10 gpm are common from many of the springs in the county.

Springs are relatively inexpensive sources for development of domestic and other supplies. Where a spring is located on a hillside above a house or other building, the water can be piped in under sufficient pressure to reach all supply facilities and fixtures in the building without use of a pump. Spring water may be easily contaminated, however, where the water table is close to the land surface in the vicinity of the discharge area and where catch basins are not properly covered or otherwise protected.

Quality of Water

As water percolates into and through the ground it dissolves and carries in suspension minerals from the unconsolidated deposits and bedrock through

Table 2.--Public water supply systems, Delaware County

(New York State Dept. of Health, 1960, p. 60-63.)

Municipality, district, or water company	Source of water	Number of people served	Consumption (gpd)	Quality of water	
				Hardness 1/ (ppm)	Alkalinity 1/ (ppm)
Andes	Springs and wells	408	75,000	22	14
Arkville	Brook and auxiliary well	300	30,000	20	8
Bloomville	Springs, auxiliary brook	249	30,000	15	7
Bovina Center	Coulter Brook	216	10,000	25	12
Cadosia (lower)	Springs	128	22,000	18	10
Cadosia (upper)	Springs	83	4,000	20	8
Cooks Falls	Springs	315	15,000	12	6
Corbett	Springs, auxiliary brook	180	25,000	16	7
Davenport	Springs	170	12,000	25	7
Delancey	Brook	200	70,000	20	7
Delhi	Steele Brook	2,200	250,000	14	7
Deposit	Big Hollow Brook, auxiliary well	1,980	250,000	18	10
Downsville	Spring	36	2,500	10	7
Downsville	Springs, auxiliary well	630	50,000	16	6
East Branch	Springs	125	12,500	2	7
Fleischmanns	Springs, auxiliary wells	445	130,000	27	14
Franklin	Springs, auxiliary well	530	36,000	20	8
Grand Gorge No. 1	Well	550	50,000	120	130
Halcottsville	Gragg Hollow Brook	105	13,000	27	20
Hamden	Springs and well	140	16,000	24	11
Hancock	Bear Brook, auxiliary well	1,248	180,000	21	18
Hancock	Wells	78	5,000	88	98
Hobart	Brooks, auxiliary well	618	100,000	20	10
Margaretville	Springs and wells	860	100,000	20	17
Roxbury	Springs	467	60,000	23	18
Sidney	Peckham and Collar Brooks, auxiliary well	4,719	800,000	190	150
Sidney Center	Herrick Hollow Creek	320	20,000	19	13
South Kortright	Springs, auxiliary well	52	10,000	22	11
Stamford	West Branch Delaware River	1,162	350,000	33	9
Treadwell	Springs or auxiliary wells	250	25,000	28	16
Walton	Brooks	3,868	400,000	25	30

1/ Average of samples analyzed.

which it passes. The solvent action of water is usually increased by the presence of carbon dioxide derived from the atmosphere, or from decaying vegetation. The amount of dissolved and suspended matter in ground water depends on the solubilities of the minerals, length of time the water and minerals are in contact, and other factors such as temperature and pressure.

The U.S. Public Health Service has set standards of maximum chemical concentration for drinking and cooking water used by interstate carriers subject to the federal quarantine regulations, part of which are paraphrased as follows:

Constituent	Maximum allowable concentration in parts per million 1/
Fluoride (F)	2/ 1.5
Iron (Fe) and manganese (Mn)	.3
Chloride (Cl)	250
Sulfate (SO_4)	250
Dissolved solids	3/ 500

1/ U.S. Public Health Service, 1946.

2/ Mandatory limit.

3/ Dissolved solids up to 1,000 ppm are permissible where better water is not available.

The concentrations shown are included only for comparative purposes. It should be noted, that they are specific regulations for specific users. The ground water of Delaware County is generally of acceptable quality for domestic and some industrial uses, although it frequently contains moderate to large amounts of iron, contains moderate to large amounts of other substances in some places, and is moderately hard to hard in some places. These constituents and characteristics of the ground water are discussed in the following paragraphs of this section. Selected chemical analyses of water from wells and springs in the county are given in table 3.

Hardness

Hardness of water is considered low in concentrations up to 60 ppm, moderate from 61 to 120 ppm, and high above 120 ppm. Eighteen of the 33 analyses given in table 3 show hardness of less than 61 ppm; 12 analyses show a moderate hardness; three analyses show high hardness.

Iron and Manganese

Iron and manganese concentrations combined exceed the U.S. Public Health Service standard of 0.3 ppm in 18 of the 33 samples analyzed (as shown in table 3). These 18 analyses show a range from 0.31 to 8.42 ppm and a median content of 0.97 ppm. Small to high iron and manganese concentrations are common for water obtained from the Upper Devonian continental beds, probably from hematite in the red shales

Table 3.--Chemical analyses of ground water, Delaware County

[Analyses by New York State Department of Health except where otherwise noted. Chemical constituents in parts per million]

Well or spring	Depth (feet)	Locality	Water-bearing unit	Date of collection	Silica (SiO_2)	Total iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Alkalinity as $CaCO_3$	Specific conductance (micromhos at 25°C)	pH
																			Calcium, magnesium	Noncarbonate			
D 4	185	East Masonville	Upper Devonian bedrock	July 11, 1946	--	1.00	0.05	--	--	--	--	--	--	17.9	3.6	--	--	95	56	--	43	--	6.6
D 8	25	West Davenport	Pleistocene sand and gravel	July 2, 1946	--	.10	< .01	--	--	--	--	--	--	9.9	1.4	--	--	145	124	--	95	--	7.6
D 25	265	Meredith	Upper Devonian red shale	July 2, 1946	--	.90	< .01	--	--	--	--	--	--	17.3	5.0	--	--	159	84	--	58	--	6.8
D 26	687	do.	Upper Devonian red shale and brown sandstone	July 2, 1946	--	.08	< .01	--	--	--	--	--	--	7.2	4.6	--	--	131	90	--	81	--	7.3
D 32	505	Delhi	Upper Devonian red shale	Nov. 8, 1947	--	1.30	1.00	--	--	--	--	--	--	81.4	23.0	--	--	231	140	--	69	--	7.3
D 38	242	West Harpersfield	Upper Devonian gray sandstone	July 2, 1946	--	.13	.05	--	--	--	--	--	--	3.0	43.0	--	--	214	72	--	129	--	8.3
D 46	62	Stamford	Upper Devonian red shale	July 2, 1946	--	4.00	< .01	--	--	--	--	--	--	8.5	1.2	--	--	111	36	--	34	--	6.3
D 51	130	Hobart	Pleistocene sand and gravel	July 3, 1946	--	.15	< .01	--	--	--	--	--	--	5.6	.4	--	--	36	22	--	16	--	7.0
D 54	108	Roxbury	Upper Devonian gray sandstone	July 1, 1946	--	.35	< .01	--	--	--	--	--	--	6.9	.8	--	--	28	22	--	15	--	6.8
D 59	140	Grand Gorge	Upper Devonian red sandstone	July 1, 1946	--	.10	.30	--	--	--	--	--	--	.0	170.0	--	--	423	112	--	129	--	7.9
D 81	240	Margaretville	Upper Devonian red sandstone and shale	Mar. 28, 1947	--	.05	< .01	--	--	--	--	--	--	5.6	5.6	--	--	98	64	--	77	--	7.7
D 82	26	do.	Pleistocene sand and gravel	July 10, 1946	--	.30	.01	--	--	--	--	--	--	12.5	4.4	--	--	68	36	--	23	--	6.2
D 86[a]	107	Arena	Upper Devonian gray sandstone	July 10, 1946	--	.25	.01	--	--	--	--	--	--	6.6	.6	--	--	30	28	--	19	--	6.0
D 95	96	Downsville	Pleistocene sand and gravel	July 10, 1946	--	.10	.03	--	--	--	--	--	--	11.5	1.4	--	--	48	22	--	15	--	5.8
D 102	420	Walton	Upper Devonian gray sandstone	July 2, 1946	--	.60	.13	--	--	--	--	--	--	15.4	800.0	--	--	1491	86	--	68	--	7.1
D 102[b]	420	do.	do.	July 22, 1957	7.9	1.60	.00	20	5.0	87	1.3	66	0	21	126	0.2	2.8	308	71	17	--	579	6.5
D 114	208	Deposit	do.	July 10, 1946	--	3.00	--	--	--	--	--	133	6	.0	310.0	--	--	611	152	--	119	--	8.2
D 116	166	Hancock	Pleistocene sand and gravel	July 10, 1946	--	.15	.02	--	--	--	--	--	--	8.9	.8	--	--	33	28	--	12	--	6.8
D 120[b]	185	do.	Upper Devonian sandstone	July 22, 1957	9.4	.12	.38	23	6.3	8.4	.8	99	0	16	5.1	.2	3.1	118	84	3	--	206	7.6
D 155	183	Davenport Center	do.	July 11, 1946	--	4.50	.28	--	--	--	--	--	--	8.6	2.2	--	--	51	26	--	28	--	6.5
D 181[b]	70	Bloomville	Pleistocene sand and gravel	May 18, 1949	8.5	.15	--	16	2.8	5.7		52	0	4.1	4.5	.0	13.0	94	51	--	--	154	7.9
D 225[b]	86	Sidney Center	Upper Devonian red sandstone	May 20, 1949	7.8	8.42	--	28	9.6	156		148	0	5.8	228	.0	.8	491	109	--	--	958	8.1
D 227	140	Sidney	Upper Devonian shale	Nov. 18, 1943	--	.04	< .01	--	--	--	--	--	--	--	4.2	--	4.0	--	60	--	--	--	7.0
D 270[b]	346	Margaretville	Upper Devonian bedrock	May 18, 1949	--	.07	< .01	--	--	--	--	--	--	9.7	2.0	--	--	65	46	--	--	34	7.1
D 395[b]	113	Elk Brook	Pleistocene sand and gravel	July 22, 1957	5.8	.07	.00	15	2.9	3.9	.5	62	0	6.1	.6	.2	.3	64	50	0	--	112	7.5

See footnotes at end of table.

Table 3.--Chemical analyses of ground water, Delaware County (Continued)

Well or spring	Depth (feet)	Locality	Water-bearing unit	Date of collection	Silica (SiO_2)	Total iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Alkalinity as $CaCO_3$	Specific conductance (micromhos at 25°C)	pH
																			Calcium, magnesium	Noncarbonate			
D 402	44	Fraser	Pleistocene sand and gravel	Jan. 21, 1949	--	0.03	< 0.01	--	--	--	--	--	--	8.5	4.8	--	--	56	24	--	17	--	6.3
D 416[b/c/]	138	Long Eddy	do.	July 22, 1957	4.7	.07	.04	14	1.7	2.0	0.6	42	0	8.5	1.1	0.1	1.6	54	42	8	--	91	6.8
D 420	172	Delhi	Upper Devonian red sandstone and shale	Nov. 8, 1947	--	2.00	1.30	--	--	--	--	--	--	30.2	19.0	--	--	155	64	--	37	--	6.5
D 421	70	do.	Pleistocene sand and gravel	Jan. 21, 1949	--	.03	1.00	--	--	--	--	--	--	35.5	36.0	--	--	201	66	--	41	--	6.2
D 476	313	South Kortright	Upper Devonian red and gray sandstones and shales	Jan. 19, 1941	--	1.80	--	--	--	--	--	--	--	--	1.8	--	--	--	94	--	84	--	7.4
D 482	90	Cannonsville	Pleistocene sand and gravel	Feb. 27, 1949	--	.40	.04	--	--	--	--	--	--	9.3	6.0	--	--	106	42	--	42	--	6.9
D 487	140	Sidney	Upper Devonian red sandstone and shale	Aug. 6, 1942	--	.60	--	--	--	--	--	--	--	--	3.6	--	.53	--	34	--	31	--	6.8
D 935p	--	Fleischmanns	Upper Devonian sandstone	July 10, 1946	--	.15	.01	--	--	--	--	--	--	5.1	1.0	--	--	26	22	--	14	--	6.5

a/ Now flooded by Pepacton Reservoir.

b/ Analysis by U.S. Geological Survey.

c/ Supplies village of Long Eddy, in Sullivan County.

and sandstones and pyrite in the gray shales; manganese minerals, in small quantities, may be common in the rocks.

The analyses show water from the bedrock to have larger amounts of iron and manganese than water from the unconsolidated deposits. Analyses of iron and manganese in water from 21 bedrock wells show a range from .05 to 8.42 ppm with a median value of .60 ppm; 11 analyses of water from unconsolidated deposits show a range from .04 to 1.03 ppm with a median value of .15 ppm. The largest concentrations occur in areas of Delaware County north of the East Branch of the Delaware River, where greater thicknesses of red shales and sandstones are present.

Iron and manganese concentrations of more than 0.3 ppm are not necessarily injurious to health; however, such amounts impart a disagreeable taste to the water and stain porcelain and clothing.

Chloride

Two of the analyses in table 3 show chloride concentrations in excess of 250 ppm; water from well D 102, a deep bedrock well at Walton, has the higher concentration of the two. Water from this well in 1946 contained 800 ppm of chloride (driller reported that natural gas was in evidence when well was drilled in 1940). In 1957 water from the same well had a greatly reduced chloride content of 126 ppm. Walton is in a valley along the crest of an anticline, and beds of Gilboa and older Devonian marine formations may not lie at great depth there. Furthermore, the anticline may be faulted (see "Faults and joints" in the preceding section on "Geology," which includes a discussion of a fault on New York Highway 10, north of Apex) and thus may provide a route for gas and ground-water movement from the older rocks. Well D 114, a bedrock well at Deposit, yielded water containing 310 ppm of chloride. The sharp bend made by the West Branch of the Delaware River at Deposit probably is indicative of a fault cutting across the trend of the folds in the county. Water from well D 387 (see table 5), about 4½ miles south of well D 114 in the valley of the West Branch of the Delaware River, was reported to have a salty taste.

Generally, the lowest chloride concentrations are in water from wells tapping unconsolidated deposits in the county.

Dissolved Solids

Dissolved solids exceeded concentrations of 500 ppm in water from wells D 102 and D 114 and approached 500 ppm in water from wells D 59 and D 225, in the analyses shown in table 3. High concentrations of dissolved solids appear to be related to the marine rocks of the area.

Hydrogen Sulfide

Some wells in Delaware County have been reported to yield water that contains hydrogen sulfide (H_2S). This constituent was found in water from wells D 32, 171, 322, 386, 420, 489, and 490 (see table 5). Natural gas also was reported in D 32. Wells D 32 and D 420 are in the valley of the West Branch of the Delaware River at Delhi, near an anticlinal crest; wells D 171 and D 322 are in the northern part of the county at Meredith and Franklin, where Upper Devonian marine rocks do not lie at great depth because of the southwestward plunge of the strata. Well D 386 lies in what is probably a faulted zone in the valley of the West Branch of the Delaware River south of Deposit; wells D 489 and D490, near Margaretville, lie near an anticlinal crest along which the East Branch of the Delaware River has carved most of its valley and where the Upper Devonian marine rocks may not be at great depth because of the regional southwestward plunge of the strata. It is apparent that the hydrogen sulfide is related to the stratigraphy and structure of the bedrock.

Temperature

During the course of the well and spring inventory in Delaware County, ground-water temperatures were measured at 63 wells and 44 springs (see tables 4 and 5). The average measured temperature of both spring and well water was 45°F.

Fluctuations of ground-water temperature are usually greatest where the water surface is near the land surface and large fluctuations of air temperature occur. At greater depth, the ground-water temperature is more nearly constant through the year, except where disturbed by man; i.e., by injection of hot water from heat-exchange devices into the ground-water body through recharge wells. According to Collins (1925, p. 98), the temperature of ground water, for practical purposes, at depths of 20 to 200 feet is about 3° to 6°F above the mean annual air temperature, and the differential between ground-water and mean annual air temperatures increases at depths of more than 300 feet.

SUMMARY

Delaware County has a relatively large area and a small population whose main water supplies are obtained from ground-water sources. Available information indicates that an average of about 5.3 million gallons of water is used daily, of which approximately 3.5 million gallons is taken from the ground; the rest is provided from surface sources. The largest villages in the county rely chiefly on streams for water supplies. Individually owned wells and springs supply about 49 percent of the county water needs; the remainder is provided by public water supply systems, many of which use ground water almost exclusively.

Ground water is taken from Upper Devonian shales, siltstones, and sandstones, mostly of continental origin, and from unconsolidated deposits of Pleistocene stratified drift and till. The best producing unit is the coarse stratified drift, because of its high permeability. The most widely exploited unit, however, is the bedrock because it is the most commonly available aquifer and is usually capable of supplying domestic needs and the small to moderate needs of most of the businesses and industries in the county. Till is relatively little used as an aquifer because of its low permeability and east of contamination of the shallow wells tapping it.

The quality of ground water in Delaware County is usually adequate for domestic and some industrial uses. The water is generally soft and low in dissolved solids and chloride, but commonly contains moderate to large amounts of iron. Moderately hard to hard water, high to excessive amounts of dissolved solids and chloride, and natural gas and hydrogen sulfide have been noted in well water from localities in the northern and northeastern parts of the county and portions of the valleys of the East and West Branches of the Delaware River. In these areas of the county, marine rocks, from which these constituents are believed to be derived, do not lie at great depth below the continental beds, because of the southwestward plunge of the regional geologic structure, local up-arching of anticlinal crests, and elevation of these strata along faults.

The aquifers of Delaware County are generally adequate for current groundwater use and appear capable of providing additional yield. The most likely areas for development of large ground-water supplies are believed to be the thick bodies of saturated, coarse stratified drift, particularly in the larger valleys, if properly screened and developed wells are used to tap these deposits.

REFERENCES CITED

Chadwick, G. H., 1932, Chemung and Portage: Eastern States Oil and Gas Weekly, v. 1, no. 17, p. 3-7.

_____, 1936, History and value of the name "Catskill" in geology: New York State Mus. Bull. 307.

Collins, W. D., 1925, Temperature of water available for industrial use in the United States: U.S. Geol. Survey Water-Supply Paper 520, p. 97-104.

Cooper, G.A., and Williams, J. S., 1935, Tully Formation of New York: Geol. Soc. America Bull., v. 46, no. 5, p. 781-868.

Fenneman, N. M., 1938, Physiography of eastern United States (1st ed.): New York, McGraw-Hill, 714 p.

Fluhr, T. W., 1953, Geology of New York City's water supply system - A progress report: The Municipal Engineers Jour., v. 39, 4th quart. issue, p. 125-145.

Mather, W. W., 1843, Geology of New York; Part 1, Comprising the geology of the first geological district: Nat. History of New York, pt. 4, v. 1.

Mordoff, R. A., 1949, The climate of New York State: Cornell Univ. Ext. Bull. 764.

New York State Department of Health, 1960, Public water supply data: Bull. 19, 186 p.

Rich, J. L., 1935, Glacial geology of the Catskills: New York State Mus. Bull. 299.

Schuchert, Charles, and Dunbar, C. O., 1947, A textbook of geology; Part 2, Historical geology (4th ed.): New York, John Wiley & Sons, 544 p.

Soren, Julian, 1961, The ground-water resources of Sullivan County, New York: New York Water Resources Comm. Bull. GW-46, 66 p.

U.S. Bureau of the Census, 1956, U.S. census of agriculture, 1954, v. 1, counties and state economic areas, part 2: Washington, U.S. Govt. Printing Office, 618 p.

_____, 1957, County and city data book, 1956: Washington, U.S. Govt. Printing Office, 565 p.

_____, 1961, Census of population: 1960; v. 1, Characteristics of the population; Part A, number of inhabitants: Washington, U.S. Govt. Printing Office.

U.S. Bureau of the Census and U.S. Bureau of Old-Age and Survivors Insurance cooperative report, 1958, County business patterns, 1st quarter, 1956, part 3, Middle Atlantic States: Washington, U.S. Govt. Printing Office.

U.S. Public Health Service, 1946, Drinking water standards: Public Health Repts., v. 61, no. 11, p. 371-384.

U.S. Weather Bureau, 1949-1960, Climatological data, New York: Ann. summaries 1948-59, v. 60, no. 13; v. 71, no. 13.

Woodward, H. P., 1957, Structural elements of northeastern Appalachians: Am. Assoc. Petroleum Geologists Bull., v. 41, no. 7, p. 1429-1440.

Table 4.--Records of representative springs in Delaware County

Location: Given in miles from nearest intersections of parallels of latitude and meridians of longitude. See Introduction for description of location system. Springs shown on plate 1.

Altitude: Approximate altitude above mean sea level determined from U.S. Geological Survey topographic maps.

Yield: In gallons per minute (gpm) as reported by owner or occupant or measured by U.S. Geological Survey. Date of measurement by the Survey is given.

Temperature: Temperature measurement followed by date was made by U.S. Geological Survey; other temperature readings reported by owner or tenant.

Use: Dom, domestic; PS, public supply; S, stock.

Spring number	Location	Owner or tenant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					gpm	Date of measurement	°F	Date of measurement		
D 1Sp	11U, 1.6S, 4.2W	Hans Reinshagen	1,300	Pleistocene gravel	50	--	44	10/12/48	Dom	
D 5Sp	12T, 6.6N, 3.8E	Willard Gregory	1,980	Upper Devonian sandstone and shale	8	--	--	--	Dom, S	
D 6Sp	12U, 5.1N, 4.1W	A. Passvuello	1,550	Pleistocene till	4	--	--	--	S	
D 7Sp	12S, 7.4S, 3.5E	Arthur Buckbee	1,200	Upper Devonian gray sandstone	7	10/15/48	51	10/15/48	Dom	
D 8Sp	12T, 7.2S, 5.4W	J. D. Morrow	1,260	Upper Devonian sandstone	3	--	--	--	Dom	Owner reports spring has large seasonal fluctuation.
D 9Sp	11U, 8.7S, 1.8W	Jerry Trimbell	1,720	do.	4	--	54	10/16/48	Dom, S	
D 11Sp	12T, 6.3N, 3.2W	George C. Mercer	1,740	Upper Devonian gray sandstone	6	--	48	10/27/48	Dom, S	
D 18Sp	12S, 8.5S, 5.7W	Thomas Brayton	1,350	do.	8	--	--	--	Dom	Six other springs nearby not used.
D 25Sp	12S, 3.5N, 7.4W	L. G. Axtell	1,160	Pleistocene till	30	--	--	--	Dom, S	Has furnished adequate supply for more than 64 years.
D 29Sp	13T, 6.6N, 5.6W	John Houck	1,640	Upper Devonian gray sandstone	7	--	50	11/ 6/48	Dom	Formerly supplied a school. Numerous springs in vicinity.
D 30Sp	13T, 4.4S, 6.1W	Valentine Ball	1,640	do.	3	--	--	--	Dom	
D 31Sp	13S, 2.3S, 4.0E	Helena Lindsay	1,080	do.	--	--	48	11/ 8/48	Dom	Supplies 25 houses.
D 45Sp	12T, 7.8S, 6.2E	Charles Peck	1,650	Upper Devonian sandstone	10	--	50	11/ 3/48	Dom, S	
D 46Sp	12U, 6.5S, 6.3W	Stanley Gray	1,640	do.	5	--	--	--	Dom, S	
D 49Sp	12U, 7.0S, 2.3W	Thomas Liddle	1,480	do.	16	--	--	--	Dom, S	
D 50Sp	12U, 8.9S, 3.0W	L. D. Miner	1,370	do.	3	--	50	11/ 4/48	Dom	
D 62Sp	13U, 7.9N, 2.2W	Fuller	1,600	do.	8	--	40	11/ 5/48	Dom, S	
D 64Sp	13U, 6.8N, 3.2W	Davis	1,400	do.	5	--	55	11/ 5/48	Dom, S	
D 66Sp	12U, 6.4S, 6.4E	Joseph Scudder	1,360	Upper Devonian shale	15	--	50	11/ 7/48	Dom, S	
D 69Sp	13U, 7.9N, 1.1E	Clarence Pierce	1,380	Upper Devonian sandstone	5	--	55	11/ 8/48	Dom	
D 70Sp	13U, 7.2N, 1.9E	P. A. Haddow	1,450	--	30	--	42	11/ 8/48	Dom, S	
D 71Sp	13U, 6.6N, 3.0E	Eugene Wickham	1,600	Upper Devonian sandstone	--	--	50	--	Dom, S	Three other springs nearby.
D 74Sp	12U, 8.0S, 3.6W	Village of Shavertown	1,900	--	60	--	--	--	None	Village site flooded by Pepacton Reservoir.
D 75Sp	12T, 4.2S, 2.2E	Village of Delancy	1,900	Upper Devonian sandstone	10	--	--	--	PS	
D 76Sp	12T, 2.0N, 5.7E	Henry McManus	1,940	Upper Devonian shale	--	--	--	--	Dom, S	Dry 3 weeks in summer of 1948.
D 79Sp	12U, 2.7N, 3.5W	B. Truesdell	2,220	--	3	--	48	--	Dom, S	
D 80Sp	12U, 4.1S, 1.0W	Village of Andes	1,761	Upper Devonian sandstone	90	--	48	11/20/48	PS	Reservoir capacity 125,000 gallons.

Table 4.--Records of representative springs in Delaware County (Continued)

Spring number	Location	Owner or tenant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					gpm	Date of measurement	°F	Date of measurement		
D 81Sp	13U, 4.4N, 4.0W	Lewis Conklin	1,600	Upper Devonian sandstone	8	--	48	11/20/48	Dom, S	
D 83Sp	13T, 1.7N, 5.7E	William Brock	1,830	do.	8	--	42	11/20/48	Dom, S	
D 84Sp	13T, 3.1N, 0.2W	Town of Corbett	1,400	do.	--	--	--	--	PS	
D 85Sp	12T, 4.3S, 0.2W	H. L. Eckert	1,420	--	45	--	50	11/23/48	PS	Dry in summer of 1948.
D 86Sp	13T, 6.1N, 2.8W	N. Y. State Dept. Conservation	1,390	Upper Devonian sandstone	3	11/23/48	45	11/23/48	None	
D 88Sp	13S, 2.0N, 3.8E	George Ruff	1,340	do.	9	--	47	11/23/48	Dom, S	
D 89Sp	13S, 3.6N, 2.6E	John Watson	1,560	--	4	--	46	11/23/48	Dom	
D 90Sp	13S, 7.6N, 5.9W	Morris Sanford	1,300	Upper Devonian sandstone	4	--	42	11/23/48	Dom	
D 91Sp	12U, 8.6S, 0.9E	Katherine Dixon	1,700	do.	9	--	--	--	--	Former public supply, village of Arena, now flooded by Pepacton Reservoir.
D 92Sp	12U, 6.5S, 5.0E	Village of Margaretville	1,580	do.	60	--	--	--	PS	Two other springs nearby.
D 93Sp	12V, 6.3S, 1.2W	Village of Fleischmanns	1,700	do.	40	--	--	--	PS	Chemical analysis of water given in table 3.
D 94Sp	12V, 2.3N, 2.7W	Village of Roxbury	1,860	do.	80	--	50	--	PS	Eleven springs supply reservoir of 224,000-gallon capacity.
D 95Sp	13T, 7.9N, 2.0W	Village of Downsville	1,700	do.	100	--	--	--	PS	Three springs supply 2 pressure tanks of 7,500-gallon capacity each.
D 96Sp	12S, 5.2S, 5.2E	Bruce McClenon	1,730	do.	4	--	44	12/ 7/48	Dom, S	
D 97Sp	12S, 4.5S, 4.8E	Fred Budicapp	1,630	do.	5	12/ 7/48	45	12/ 7/48	Dom, S	
D 99Sp	12S, 1.9S, 4.0E	Ralph Taylor	1,980	do.	4	12/ 7/48	47	12/ 7/48	Dom, S	Two other springs nearby.
D 100Sp	12S, 2.3S, 3.2E	William Carroll	1,900	do.	3	--	--	--	Dom	Dry in summer of 1948.
D 103Sp	12S, 1.4S, 2.1E	Ernest Allen	1,900	do.	1	--	47	12/ 8/48	Dom, S	
D 104Sp	12S, 2.6S, 0.1W	Kenneth Smith	1,720	do.	¾	12/ 8/48	43	12/ 8/48	Dom, S	
D 105Sp	12S, 6.2S, 3.2E	L. Scofield	1,520	do.	3	12/ 9/48	46	12/ 9/48	Dom	
D 106Sp	12S, 5.5S, 1.3E	Carl Close	1,980	do.	3	12/ 8/48	48	12/ 8/48	Dom, S	
D 107Sp	12S, 6.8S, 2.3W	Harlan Walley	1,200	do.	3	12/ 8/48	48	12/ 8/48	Dom, S	
D 108Sp	12S, 5.3S, 3.4W	Charles Webb	1,460	do.	5	--	46	12/ 8/48	Dom, S	
D 109Sp	12S, 1.8S, 4.0W	Fred Wilson	1,620	do.	3	--	45	--	Dom, S	
D 110Sp	12S, 1.6S, 6.5W	Kenneth Lent	1,400	Upper Devonian shale	1½	12/ 8/48	46	--	Dom, S	
D 111Sp	12S, 8.9S, 3.2W	Richard Finch	1,140	Upper Devonian sandstone	2½	12/10/48	46	12/10/48	Dom, S	
D 114Sp	12S, 7.3S, 8.3W	Earl Jones	1,370	do.	2	12/10/48	38	12/10/48	Dom	
D 117Sp	13S, 7.0N, 3.1E	John Ludwig	1,460	do.	30	--	--	--	Dom, S	Supplies farm and hotel; overflow is source of water for several nearby families.
D 118Sp	13T, 5.9N, 7.5W	Frank Strobel	1,920	do.	10	--	33	12/11/48	Dom, S	

Table 4.--Records of representative springs in Delaware County (Continued)

Spring number	Location	Owner or tenant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					gpm	Date of measurement	°F	Date of measurement		
D 119Sp	13T, 4.9N, 6.4W	William Jaycox	1,500	Upper Devonian sandstone	5	12/11/48	34	12/11/48	Dom, S	
D 120Sp	13T, 7.6N, 1.6E	E. Johnson	1,300	do.	1	12/11/48	--	--	Dom	
D 121Sp	12T, 9.1S, 2.6E	Leon Gray	1,660	do.	2	12/11/48	--	--	Dom, S	
D 122Sp	12T, 9.2N, 4.3W	William Boning	1,760	do.	½	--	--	--	Dom, S	
D 123Sp	12S, 8.0N, 3.7E	Village of Franklin	1,680	do.	45	--	--	--	PS	
D 124Sp	12S, 7.0N, 4.7E	do.	1,220	do.	20	--	--	--	PS	
D 125Sp	11T, 5.5S, 1.8W	John Westfall	1,920	do.	2	--	--	--	Dom	
D 126Sp	11T, 3.0S, 4.3E	Alton Potter	1,560	do.	½	--	40	--	Dom, S	Dry several weeks during summers.
D 127Sp	11U, 2.2S, 7.5W	Gordon Bennett	1,400	do.	3	--	37	--	Dom	
D 128Sp	11U, 1.7S, 5.5W	W. White	1,440	do.	3¾	12/14/48	38	--	Dom, S	
D 129Sp	11T, 6.8S, 4.5W	Fred Normann	1,800	do.	3	--	34	12/15/48	Dom	
D 130Sp	12S, 4.5N, 6.0E	Louis Goodrich	1,420	do.	1	12/15/48	35	--	Dom	
D 132Sp	12T, 3.0N, 4.2W	Frank Wally	2,000	do.	2¼	12/15/48	34	--	Dom, S	
D 133Sp	12T, 3.7N, 2.2W	Martin Harris	2,060	do.	1	12/15/48	32	12/15/48	Dom	
D 134Sp	12T, 4.3N, 3.7W	Whitehead	1,890	Upper Devonian shale	1	12/15/48	32	12/15/48	Dom	
D 135Sp	11T, 7.8S, 0.9W	James Lane	1,560	Upper Devonian sandstone	1	--	38	--	Dom	
D 136Sp	12T, 5.2S, 5.7W	Walton Water Co.	1,410	do.	13	--	--	--	PS	Constitutes one-tenth of municipal supply.
D 138Sp	12U, 6.6N, 3.2W	Bloomville Water Co.	1,560	do.	--	--	--	--	PS	Four other springs in supply system.
D 139Sp	12U, 6.4N, 1.8W	Dudley Pittenger	1,520	do.	3	--	--	--	Dom, S	
D 140Sp	12U, 7.4N, 0.1E	George Van Kleeck	1,750	do.	2½	12/17/48	40	--	Dom, S	
D 142Sp	12V, 1.2S, 5.0W	Fred Knapp	1,570	do.	5	--	34	--	Dom	Large seasonal fluctuation.
D 144Sp	12S, 7.9N, 3.5E	Village of Franklin	1,690	do.	40	--	--	--	PS	
D 145Sp	12T, 5.0N, 6.2E	L. T. Stanton	1,600	do.	2½	1/12/49	--	--	Dom, S	
D 146Sp	12T, 5.9N, 6.5E	E. McDonald	1,580	do.	3	--	--	--	Dom, S	
D 147Sp	12U, 7.2N, 6.6W	E. M. Himers	1,800	do.	2	1/12/49	--	--	Dom	
D 148Sp	12U, 8.2N, 7.5W	L. Prescott	2,080	do.	4	--	--	--	Dom, S	
D 150Sp	12T, 9.0N, 5.4E	Arthur Ogborn	2,085	do.	1	1/12/49	48	--	Dom, S	
D 151Sp	12U, 9.0N, 6.5W	Cecil Curtis	1,870	do.	1½	1/13/49	50	--	Dom, S	
D 153Sp	11U, 6.9S, 6.0W	Ludwig Knak	1,550	do.	1½	1/13/49	--	--	Dom, S	
D 156Sp	11U, 6.5S, 3.4W	Clyde Briggs	1,910	do.	2½	1/13/49	48	--	Dom, S	
D 157Sp	12U, 8.3N, 2.1W	Theodore Cillis	1,690	do.	2½	1/13/49	60	--	Dom	
D 158Sp	11U, 8.2S, 3.6W	Marshal Worden	2,030	do.	½	1/13/49	47	--	Dom, S	

Table 4.--Records of representative springs in Delaware County (Continued)

Spring number	Location	Owner or tenant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					gpm	Date of measurement	°F	Date of measurement		
D 159Sp	11U, 5.7S, 5.3W	Kenneth Kelso	1,640	Upper Devonian sandstone	9	1/13/49	55	--	Dom, S	
D 160Sp	11U, 4.3S, 7.8W	H. N. Denton	1,400	do.	1½	1/13/49	--	--	Dom	
D 162Sp	11T, 8.7S, 0.2E	John Laing	1,920	do.	3	--	53	--	Dom, S	
D 163Sp	11T, 8.0S, 0.9E	James Laing	1,720	do.	8	--	48	--	Dom, S	
D 164Sp	11T, 7.3S, 1.9E	Homer Loucks	1,820	do.	1	1/14/49	50	--	Dom	
D 165Sp	11T, 6.8S, 5.2E	Henry Mayerhoff	2,090	do.	3	--	39	--	Dom, S	
D 166Sp	11T, 7.1S, 3.6E	Fred Herold	2,100	do.	2	1/14/49	47	--	Dom, S	Dry during dry seasons.
D 167Sp	12T, 0.5N, 1.4E	Martin Mostert	1,500	do.	6	1/15/49	47	--	Dom, S	
D 168Sp	12T, 2.7N, 0.4E	Alton Francisco	1,970	do.	2	--	47	--	Dom, S	
D 171Sp	12S, 6.1N, 0.1E	J. Gager	1,220	do.	3	--	50	1/15/49	Dom, S	
D 173Sp	12T, 1.4N, 2.5E	Harold Mason	1,440	do.	3	--	--	--	Dom	
D 177Sp	12S, 2.0S, 3.1W	Ray M. Dean	1,820	do.	10	--	48	--	Dom, S	
D 178Sp	12S, 1.3S, 5.5W	M. Gifford	1,740	do.	1½	1/17/49	48	--	Dom	
D 179Sp	13S, 6.1N, 5.8W	E. S. Palmer Estate	1,025	Pleistocene sand and gravel	5	--	54	--	Dom	
D 180Sp	13S, 3.7N, 3.2W	Harry Shield	1,770	Upper Devonian sandstone	3	--	--	--	Dom, S	
D 181Sp	13S, 2.5N, 2.8W	Clark Seymour	1,440	do.	4	1/17/49	50	--	Dom, S	
D 182Sp	13S, 1.2N, 2.8W	Ray Knapp	1,250	do.	3	--	45	--	Dom, S	
D 184Sp	13S, 1.8S, 3.4W	Joseph Baier	1,040	do.	5	--	46	--	Dom, S	
D 185Sp	13S, 5.8N, 2.2E	Thomas DeMann	1,260	do.	5	--	46	--	Dom	
D 186Sp	13S, 3.4N, 8.4W	Nelson Stevens	1,120	do.	2	1/19/47	50	--	Dom, S	
D 189Sp	12T, 1.7S, 1.3E	E. Bush	1,640	do.	1½	1/20/49	--	--	Dom	
D 190Sp	12T, 0.3S, 3.5E	J. W. Anderson	1,900	do.	4	--	48	1/20/49	Dom, S	
D 193Sp	12T, 1.6S, 4.2E	Edward Conklin	2,080	do.	3	1/20/49	42	1/20/49	Dom, S	
D 195Sp	12T, 2.5S, 4.4E	Margaret McPhail	1,860	do.	5	--	42	1/20/49	Dom, S	
D 196Sp	12T, 2.1S, 6.3E	Lloyd Thompson	1,740	do.	3	--	50	--	Dom	
D 198Sp	12U, 0.4S, 6.4W	Joseph Torma	2,200	do.	1	--	33	1/20/49	Dom	
D 201Sp	12U, 1.8S, 3.9W	Gerry Estate	1,880	do.	15	--	55	--	Dom	
D 202Sp	13S, 1.7S, 1.2W	Vincent Kerwin	1,240	do.	20	--	48	--	PS	Public supply, Cadosia.
D 203Sp	12U, 0.2S, 2.7W	Clarence Burns	1,820	do.	4½	1/22/49	48	--	Dom, S	
D 205Sp	12U, 2.8S, 2.0W	Benny DeBalus	1,870	do.	6	--	42	--	Dom, S	
D 206Sp	12U, 4.3S, 2.6W	Walter Ruff	1,900	do.	3	--	42	--	Dom, S	

Table 4.--Records of representative springs in Delaware County (Continued)

Spring number	Location	Owner or tenant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					gpm	Date of measurement	°F	Date of measurement		
D 207Sp	12T, 4.4S, 5.2E	Robert Tyler	1,760	Upper Devonian sandstone	4½	1/27/49	50	--	Dom, S	
D 208Sp	12T, 4.9S, 3.8E	Oliver Fairbairn	1,860	do.	2½	1/27/49	55	--	Dom	
D 209Sp	12U, 5.2S, 1.8W	John Roney	1,620	do.	2½	1/27/49	48	--	Dom, S	
D 211Sp	12U, 6.7S, 1.2W	Frank Winkler	2,100	do.	6	--	46	--	Dom, S	
D 212Sp	12U, 8.6S, 0.2W	Anna Kilter	1,590	do.	4	--	42	--	Dom	
D 213Sp	13U, 6.2N, 1.9W	E. A. Van Keuren	1,360	do.	12	--	55	--	Dom	
D 214Sp	13U, 5.0N, 0.2W	Floyd Rose	1,670	do.	45	1/26/49	60	--	Dom, S	
D 215Sp	13U, 5.2N, 0.6E	Leo Smith	2,220	do.	3	--	60	--	Dom, S	
D 216Sp	13U, 3.0N, 0.8E	Max Schechner	2,100	do.	4	1/27/49	45	1/27/49	Dom, S	Dry for short periods in summer. Supplies resort and menagerie.
D 217Sp	13U, 4.8N, 6.6W	Floyd Ellett	1,420	do.	1	1/28/49	55	--	Dom	
D 218Sp	13U, 2.8N, 5.0W	Alonzo Van Bramer	2,360	do.	4	--	40	--	Dom, S	
D 219Sp	13U, 0.3N, 5.2W	--	1,650	do.	5	1/28/49	45	1/28/49	Dom	
D 220Sp	13T, 0.1S, 5.6E	George Heer	1,620	do.	2	--	48	--	Dom	
D 221Sp	12T, 4.2N, 3.3E	Robert Smith	1,830	do.	3	--	50	--	Dom, S	
D 222Sp	12T, 6.4N, 1.9E	Raymond Ogborn	2,020	do.	2	--	55	--	Dom, S	
D 223Sp	12T, 6.2N, 0.8E	Herbert Martin	1,880	do.	3	--	42	--	Dom, S	
D 224Sp	12T, 6.7N, 0.2W	Raymond Ogborn	1,780	do.	2	--	--	--	Dom	
D 225Sp	12T, 6.7N, 1.3W	C. W. Delameter	1,630	do.	3	--	56	--	Dom, S	
D 226Sp	12T, 7.8N, 3.1W	Henry Boecke	1,780	do.	2	2/ 8/49	55	--	Dom, S	
D 228Sp	12T, 8.0N, 1.4W	Earl Decker	1,940	do.	3	--	55	--	Dom	
D 229Sp	12T, 3.2N, 1.6E	Ralph Stein	1,780	do.	4	2/ 9/49	48	--	Dom, S	
D 231Sp	13T, 1.6N, 4.3W	Lee Williams	1,300	do.	6	2/ 9/49	42	--	Dom, S	
D 232Sp	13S, 1.8N, 6.1E	B. Ivery	1,120	do.	15	--	55	--	Dom, S	
D 234Sp	12U, 4.7S, 1.2E	W. S. Daig	1,980	do.	30	2/10/49	48	--	S	
D 235Sp	12U, 6.2S, 2.5E	J. Van Benschoten	1,790	do.	10	2/10/49	55	--	Dom, S	
D 237Sp	12U, 1.2S, 4.3E	Harry O'Connor	1,860	do.	5	2/10/49	55	--	Dom, S	
D 238Sp	12U, 1.2S, 3.3E	B. Robertson	1,940	do.	5	2/10/49	50	--	Dom	
D 239Sp	12U, 0.7S, 2.6E	Frank Long	1,870	do.	2½	2/10/49	55	--	Dom, S	
D 240Sp	12U, 4.7S, 2.6E	William Kraemer	1,760	do.	10	2/10/49	55	--	Dom	
D 241Sp	12U, 7.6S, 2.5E	Howard Samuels	1,440	do.	3	2/10/49	55	--	Dom, S	
D 242Sp	12V, 8.9S, 4.3W	Albert Rosa	1,800	do.	7	2/10/49	50	--	Dom	

Table 4.--Records of representative springs in Delaware County (Continued)

Spring number	Location	Owner or tenant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					gpm	Date of measurement	°F	Date of measurement		
D 243Sp	12V, 4.9S, 0.6W	Russell Morrison	1,820	Upper Devonian sandstone	3	2/10/49	58	--	Dom, S	
D 245Sp	12V, 6.1S, 4.0W	L. Bowles	1,640	do.	2	2/11/49	52	--	Dom	
D 246Sp	12V, 5.0S, 2.8W	Arthur Blish	1,860	do.	3	--	50	--	Dom, S	
D 251Sp	12V, 2.5N, 0.9W	K. Rossman	2,230	do.	5	--	49	--	Dom, S	
D 252Sp	12V, 0.1S, 5.2W	K. Hammond	1,500	do.	2	--	58	--	Dom, S	
D 253Sp	12V, 2.5N, 6.1W	Lynn Cammer	1,870	do.	2	2/16/49	55	--	Dom, S	
D 254Sp	12U, 2.5N, 5.2E	G. Braner	2,140	do.	1	2/16/49	42	--	Dom, S	
D 255Sp	12V, 3.6N, 1.4W	John Schineller	2,100	do.	4	--	42	--	Dom	
D 257Sp	12U, 3.4N, 3.5E	John Burns	2,200	do.	4	--	48	--	Dom, S	
D 258Sp	12U, 3.8N, 1.9E	R. T. Crosley	2,220	do.	½	2/19/49	50	--	Dom, S	
D 259Sp	12U, 3.2N, 0.2E	James Lane	2,300	do.	3	--	48	--	Dom	Sometimes dry during summer.
D 260Sp	12U, 5.5N, 2.3E	Harold Stevens	1,870	do.	3½	2/18/49	52	--	Dom, S	
D 261Sp	12U, 5.0N, 3.9E	Peter Madsen	2,140	do.	4½	2/18/49	50	--	Dom, S	
D 263Sp	12U, 5.3N, 6.1E	A. W. Morse	2,160	do.	20	2/18/49	47	--	Dom, S	
D 264Sp	12U, 7.8N, 1.0E	Harold Dibble	1,660	do.	5	--	--	--	Dom	Sometimes dry as long as 2 months during summer.
D 265Sp	11U, 6.7S, 0.6E	Clifton Sackett	1,760	do.	2	2/19/49	--	--	Dom, S	
D 266Sp	11U, 7.1S, 3.9E	Barber	2,080	--	1½	2/20/49	52	--	Dom, S	
D 268Sp	11U, 2.6S, 0.5E	Rocco Ardito	1,500	Upper Devonian sandstone	3	--	55	--	Dom	
D 269Sp	12V, 7.6N, 5.0W	Donald Post	1,960	Upper Devonian shale	3	--	48	--	Dom	
D 270Sp	11U, 8.5S, 6.7E	W. P. Merwin	2,240	Upper Devonian sandstone	4	--	57	--	Dom	
D 271Sp	11U, 6.5S, 8.0E	William Moore	1,910	do.	5	--	55	--	Dom, S	
D 272Sp	13T, 4.5S, 1.3E	Cooks Falls Water Co.	1,450	--	18	--	--	--	PS	Four springs nearby.
D 273Sp	13T, 2.3S, 4.4W	George Lechner	1,180	Upper Devonian sandstone	1/3	2/23/49	--	--	Dom	
D 274Sp	13T, 3.6S, 2.9W	E. E. Steinmetz	1,500	do.	2	2/23/49	48	--	Dom, S	Sometimes dry during summer.
D 275Sp	13T, 5.7S, 0.8W	Leon Thomas	1,810	do.	2	2/23/49	57	--	Dom	
D 276Sp	13T, 4.6S, 3.0W	H. J. Wenzel	1,480	do.	3	--	47	--	Dom	
D 278Sp	13T, 7.5S, 2.6W	R. Stewart	1,700	do.	3	2/23/49	52	--	Dom, S	
D 279Sp	13S, 1.7S, 1.8E	Earl Tompkins	1,000	do.	1¼	2/25/49	60	--	Dom, S	
D 280Sp	13T, 7.0S, 4.6W	Fred Brown	1,400	do.	7	2/25/49	50	--	Dom, S	
D 281Sp	13S, 7.7S, 5.4E	Francis Peake	1,440	do.	6	2/25/49	45	--	Dom	
D 282Sp	13T, 2.7N, 2.0W	J. C. Cable	1,100	do.	6	--	45	--	Dom, S	

Table 4.--Records of representative springs in Delaware County (Continued)

Spring number	Location	Owner or tenant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					gpm	Date of measurement	°F	Date of measurement		
D 283Sp	13S, 6.6S, 5.2E	Jay Smith	1,600	Upper Devonian sandstone	15	--	48	--	Dom	Sometimes dry during September.
D 284Sp	13S, 3.5S, 1.1E	W. K. Peters	1,100	do.	2	--	46	--	Dom, S	
D 285Sp	12V, 6.5S, 0.8W	St. Regis Hotel	1,800	do.	--	--	--	--	Dom	Another spring nearby also used. Both springs supply needs of up to 300 guests. Combined yield barely sufficient in some summers.

Table 5.--Records of representative wells in Delaware County

Location: Given in miles from nearest intersections of parallels of latitude and meridians of longitude. See Introduction for description of well-location system. Wells shown on plate 1.

Altitude: Approximate altitude above mean sea level determined from U.S. Geological Survey topographic maps.

Type of well: Drl, drilled; Drv, driven; Dug.

Water level: Reported by owner, occupant, or driller. Date is uncertain, but is presumed to be date well was completed.

Yield: In gallons per minute (gpm) as reported by owner or driller.

Use: Com, commercial; Dom, domestic; F, farm; Ind, industrial; N, not used; Obs, observation well; PS, public supply; S, stock; TB, test boring; TW, test well.

Remarks: Information shown in this table was reported by owners and drillers; (a) chemical analysis of water given in table 3; (b) driller's log given in table 6.

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 1	12S, 4.7N, 7.8W	Village of Sidney	--	985	Drl	--	6	200	Pleistocene sand and gravel	--	1,000	TW	
D 2	12S, 4.3N, 6.8W	do.	1945	1,050	Drl	90	6	--	do.	--	1,000	TW	
D 3	12S, 2.2N, 7.5W	Jess Howe	--	1,640	Drl	190	6	60	Upper Devonian bedrock	--	25	Dom	Used to flow several gpm.
D 4	12S, 2.0N, 2.9W	Tracy Birdsall	--	1,780	Drl	185	6	50	do.	--	20	Dom, F	(a).
D 6	12S, 2.9N, 0.5W	Jess Howe	--	1,280	Drl	105	6	100	do.	--	--	Com	Used to flow 30 gpm.
D 8	11T, 4.3S, 0.7W	E. J. Carrington	--	1,125	Drv	25	1½	--	Pleistocene sand and gravel	--	--	Dom	(a).
D 10	11T, 4.2S, 0.2W	Max Schweizer	--	1,125	Drv	14	1½	--	do.	--	--	Dom	
D 11	11T, 4.8S, 0.7E	Mrs. Timpelt	--	1,220	Dug	30	36	--	do.	--	--	Dom	
D 14	11T, 4.7S, 1.5E	Fred Behrens	--	1,300	Dug	10	24	--	do.	--	--	Dom	
D 15	11T, 4.5S, 1.5E	Clark MacDonald	--	1,300	Dug	20	24	--	do.	--	--	Dom	
D 16	11T, 4.5S, 1.8E	Leroy Fisher	--	1,290	Dug	20	48	--	do.	--	--	Dom	
D 17	11T, 4.7S, 1.9E	Ida Fish	--	1,290	Dug	18	30	--	do.	--	--	Dom	
D 18	11T, 4.3S, 1.8E	Mary Ross	--	1,182	Drv	20	1¼	--	do.	--	--	Dom	
D 20	11T, 4.4S, 2.1E	John Burdick	--	1,182	Drv	25	1½	--	do.	--	--	Dom	
D 21	11T, 4.1S, 3.9E	Sheffield Farms Co.	1939	1,220	Drl	276	6	176	Upper Devonian gray sandstone	13	50	Ind	(b).
D 22	11T, 5.2S, 3.7E	Pumpkin Hollow School	--	1,510	Drl	120	6	30	do.	--	5	Dom	
D 23	12T, 7.8N, 0.6E	Elizabeth Gesell	1943	1,940	Drl	265	6	7	Upper Devonian red shale	--	--	Dom	
D 24	12T, 8.4N, 2.9E	Meridale Farms	--	1,860	Drl	235	8	18	do.	--	50	S	
D 25	12T, 7.6N, 3.4E	do.	--	2,140	Drl	265	8	30	do.	--	50	S	(a).
D 26	12T, 7.5N, 3.2E	do.	1928	2,140	Drl	687	8	2	Upper Devonian red shale and brown sandstone	--	35	S	(a).
D 27	11U, 6.3S, 2.3W	Hegeman Dairy	1945	1,872	Drl	315	8	30	Upper Devonian red sandstone and shale	--	--	--	
D 28	12U, 6.2N, 2.7W	Sheffield Farms Co.	1940	1,500	Drl	150	6	--	Upper Devonian bedrock	--	--	Ind	Supplies 4,000 gpd for boiler use.
D 29	12T, 3.0N, 4.8E	S. L. Weideman	--	1,400	Drl	140	6	60	Upper Devonian red shale	--	10	Dom	
D 30	12T, 2.4N, 4.0E	Morris Afron	--	1,500	Drl	70	6	--	Pleistocene sand and gravel	--	3	Dom	
D 32	12T, 1.2N, 4.0E	Delaware County Farmers Cooperative Creamery	1941	1,350	Drl	505	8	60	Upper Devonian red shale	14	50	N	Water reported to contain flammable gas, hydrogen sulfide, and much sediment. (a).

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 33	12T, 1.5N, 4.2E	Dairymen's League	1934	1,365	Drl	256	8	--	Upper Devonian red shale	20	125	Ind	
D 34	12U, 0.9N, 1.4W	Bovina Center Cooperative Creamery	1902	1,680	Drl	--	6	60	Pleistocene sand and gravel	--	--	Ind	Used to flow several gpm. Water contains hydrogen sulfide.
D 35	11U, 4.7S, 0.6E	James Herron	--	1,560	Dug	12	22	--	do.	9	--	Dom	
D 36	11U, 4.5S, 0.3E	North Kortright Church	--	1,600	Dug	25	36	--	do.	--	--	Dom	
D 37	11U, 4.6S, 1.7E	W. D. Oliver	--	1,587	Drl	70	8	65	Upper Devonian red shale	Flows	--	Dom	
D 38	11U, 4.8S, 1.5E	The B. & B. Dairy Co.	1913	1,600	Drl	242	5	70	Upper Devonian gray sandstone	--	100	Ind	Another well 85 ft deep nearby. (a).
D 40	11U, 4.3S, 3.3E	Clyde Rodgers	--	1,720	Dug	12	24	--	Pleistocene sand	--	--	Dom	
D 42	11U, 4.8S, 4.3E	Quirk	1800	1,750	Dug	20	36	--	Pleistocene sand and gravel	--	--	Dom	
D 43	11U, 6.0S, 3.7E	Stephen Vamosy	--	2,080	Drl	198	6	40	Upper Devonian red and gray sandstone	--	3	S	
D 44	11U, 5.9S, 3.9E	Michael Vamosy	--	2,100	Drl	70	6	20	Upper Devonian red shale	--	4	S	
D 46	11U, 6.9S, 6.4E	John R. Watson Greenhouse	1932	1,770	Drl	62	8	20	do.	--	25	Com	Supplies greenhouse. (a), (b).
D 47	11U, 7.5S, 5.6E	Darby	--	1,740	Drl	150	8	90	do.	--	75	N	
D 49	12U, 7.2N, 1.7E	Gould Farms	1921	1,540	Drl	230	6	40	do.	--	25	Dom, S	
D 50	12U, 5.7N, 1.0E	Georgiana Brock	--	1,560	Drl	195	6	70	do.	--	20	Dom, S	
D 51	12U, 8.5N, 4.4E	Hobart Water Co.	1944	1,680	Drl	130	12 to 8	130	Pleistocene sand and gravel	30	100	PS	Drawdown about 75 ft after pumping 100 gpm for several hours. Diameter reduced at 80 ft. Casing is slotted and well gravel packed from 80 to 130 ft. (a).
D 52	12V, 7.7N, 0.8W	Sheffield Farms Co.	1932	1,580	Drl	600	8	76	Upper Devonian red and gray bedrock	--	8	N	Abandoned because of small yield. (b).
D 53	12V, 7.7N, 0.8W	do.	1927	1,580	Drl	340	8	60	Upper Devonian red shale	--	--	--	
D 54	12V, 5.6N, 2.5W	Conro	1944	1,620	Drl	108	6	20	Upper Devonian gray sandstone	--	7	Dom, S	(a).
D 55	12V, 5.7N, 2.4W	Howard Clum	--	1,800	Drl	25	6	--	Pleistocene till	--	7	Dom	
D 56	12V, 4.9N, 2.9W	Daitch Creamery	1938	1,540	Drl	404	8	60	Upper Devonian bedrock	--	450	Ind	Has been pumped at 450 gpm for periods of 24 hrs.
D 57	12V, 3.4N, 3.0W	Village of Roxbury	--	1,500	Drl	200	--	30	Upper Devonian red shale	--	--	N	Used to flow 100 gpm.
D 58	12V, 1.0S, 4.9W	Carl Hinkley	1945	1,450	Drl	86	6	--	Pleistocene sand and gravel	18	35	Dom, S	
D 59	12V, 8.2N, 0.7E	Hinkeley's Garage	--	1,400	Drl	140	6	90	Upper Devonian red sandstone	--	25	Com	Used to flow 5 gpm. (a), (b).
D 60	12V, 8.2N, 0.9E	William Riley	--	1,450	Drl	107	6	10	do.	--	30	Dom	Used to flow 2 gpm.
D 62	12V, 8.6N, 0.1E	Upstate Water Co.	--	1,420	Drl	140	6	--	Pleistocene sand and gravel	--	--	N	Used to flow 40 gpm. Another well 112 ft deep nearby was pumped at 135 gpm.
D 64	12V, 3.0S, 5.2W	Sheffield Farms Co.	1910	1,400	Drv	35	2	--	do.	--	--	Ind	
D 65	12V, 7.0S, 0.4W	Clarence Falconer	--	1,740	Drl	27	6	15	Upper Devonian red sandstone	--	6	Dom	
D 66	12V, 7.2S, 0.5W	Henry Wallman	--	1,700	Drl	112	6	10	do.	--	12	Dom	

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 67	12V, 6.8S, 1.6W	Village of Fleischmanns	1923	1,520	Drl	90	6	16	Upper Devonian gray sandstone	10	120	PS	Drawdown about 20 ft after pumping 120 gpm for 20 min.
D 68	12V, 6.8S, 2.2W	Hans Martens	--	1,520	Drl	125	6	15	do.	--	3	Dom	
D 70	12V, 6.9S, 5.6W	Louis Johnson	--	1,400	Drl	43	6	--	Pleistocene sand and gravel	--	12	Dom	
D 71	12V, 8.3S, 5.2W	Sondenburg	--	1,520	Drl	68	6	8	Upper Devonian gray and red sandstones	--	15	Dom	
D 72	12V, 8.0S, 5.6W	Edward Koeller	--	1,420	Drl	30	6	--	Pleistocene sand and gravel	--	50	Dom	
D 75	12V, 7.9S, 5.8W	Leo George	--	1,440	Drl	70	6	55	Upper Devonian gray and red sandstones	--	5	Dom	
D 76	12U, 4.5S, 2.1W	Andes Cooperative Creamery	1946	1,600	Drl	20	8	--	Pleistocene sand and gravel	4	130	Ind	Finished with 8 ft of 8-in. screen, no. 50 slot. Drawdown 4 ft after pumping 130 gpm for short time.
D 78	12U, 7.3S, 6.0E	Carl Rohnay	--	1,360	Drl	186	6	13	Upper Devonian gray and red bedrock	--	7	Dom	Nearby well on property, drilled to depth of 348 ft, was dry. (b).
D 79	12U, 7.5S, 5.2E	The B. & B. Dairy Co.	1944	1,320	Drl	45	6	--	Pleistocene sand and gravel	--	240	Ind	
D 80	12U, 7.5S, 5.2E	do.	1920	1,320	Drl	89	6	44	Upper Devonian gray shale	--	--	Ind	
D 81	12U, 6.5S, 5.0E	Village of Margaretville	1940	1,480	Drl	240	6	30	Upper Devonian red sandstone and shale	--	75	PS	(a).
D 82	12U, 7.8S, 5.1E	do.	1940	1,320	Drl	26	6	--	Pleistocene sand and gravel	--	150	PS	(a).
D 83	12U, 8.0S, 5.1E	Edward Cantwell	--	1,360	Drl	198	6	140	Upper Devonian red sandstone	--	4	Dom	
D 86	13U, 8.5N, 0.1W	J. C. Haddow	--	1,260	Drl	107	6	80	Upper Devonian gray sandstone	--	12	Dom, F	Flooded by Pepacton Reservoir. (a).
D 87	12U, 4.5S, 2.1W	Andes Cooperative Creamery	1946	1,600	Drl	500	12 to 8	78	Upper Devonian bedrock	--	25	Ind	Flowed 25 gpm, 2 ft above land surface when drilled.
D 88	12T, 0.2S, 2.0E	Dairyland Milk & Creamery	--	1,325	Drl	150	8	90	Upper Devonian red shale	--	150	Ind	
D 89	12T, 0.2S, 2.0E	do.	--	1,325	Drl	80	8	--	Pleistocene sand and gravel	--	100	Ind	
D 90	12T, 0.2S, 2.0E	do.	1944	1,325	Drl	110	--	--	do.	--	180	Ind	
D 91	12T, 4.0S, 0.5E	Ferndale Creamery	--	1,280	Drl	520	6	70	Upper Devonian red and gray bedrock	--	100	Ind	
D 92	13T, 6.5N, 4.7E	Jacob Bowuld	--	1,160	Drl	90	6	70	Upper Devonian gray sandstone	--	8	Dom	Flooded by Pepacton Reservoir.
D 93	13T, 6.0N, 0.4E	Gregory's Store	--	1,120	Drl	100	6	18	Upper Devonian bedrock	--	10	Dom	
D 94	13T, 5.5N, 0.5E	Hillis	--	1,100	Drl	60	6	--	Pleistocene sand and gravel	--	10	Dom	
D 95	13T, 5.1N, 0.7E	Dairymen's League	--	1,100	Drl	96	6	--	do.	28	60	Ind	(a).
D 96	13T, 6.3N, 0.2E	Village of Downsville	1942	1,180	Drl	160	6	60	Upper Devonian gray sandstone	.1	35	PS	
D 97	12S, 1.9S, 7.6E	Archibald Tweedie	--	1,840	Drl	185	6	3	do.	--	10	Dom, S	
D 98	12S, 1.7S, 7.4E	Joseph Rensma	--	1,880	Drl	240	6	100	do.	--	20	Dom, S	
D 99	12S, 5.3S, 5.9E	Sheffield Farms Co.	--	1,240	Drl	205	--	52	do.	7	85	N	
D 100	12S, 5.3S, 5.9E	do.	--	1,220	Drl	224	--	66	do.	--	96	N	(b).

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 101	12S, 5.6S, 6.0E	Dairymen's Cooperative Assoc.	1924	1,220	Drl	140	8	32	Upper Devonian bedrock	--	50	N	
D 102	12S, 5.9S, 5.8E	Middletown Milk and Cream Co.	1940	1,220	Drl	420	8	114	Upper Devonian gray sandstone	80	160	Ind	Well penetrated small pocket of flammable gas. (a), (b).
D 103	12S, 5.9S, 5.8E	Breakstone Brothers	1940	1,220	Drl	407	10 to 8	58	do.	25	175	Ind	Principal water-bearing beds encountered at 350 ft and 407 ft.
D 105	13S, 6.3N, 2.9E	Venetian Inn	--	1,200	Drl	105	6	80	do.	--	40	Dom	
D 106	12S, 3.3S, 1.4W	Howe's Store	--	1,280	Drl	130	6	60	Upper Devonian red shale	--	40	Dom	
D 109	13S, 6.6N, 4.1W	Joe Rando's Friendly Tavern	--	1,060	Drl	180	6	80	Upper Devonian gray sandstone	--	3	Dom	
D 110	13S, 4.0N, 3.0W	Camp Hilltop	--	1,750	Drl	300	6	0	do.	--	20	Dom	
D 111	13S, 5.5N, 4.5W	Eugene Bennett	--	1,060	Drl	155	6	86	do.	--	25	Dom, S	
D 112	13S, 5.3N, 7.4W	H. R. Stoodley	1945	940	Drl	157	6	135	do.	--	10	Dom	(b).
D 113	13S, 6.2N, 7.5W	Lee Conklin	1941	1,030	Drl	206	6	100	do.	15	40	Dom, S	
D 114	13S, 4.8N, 8.1W	Chester Ray	--	1,000	Drl	208	6	121	do.	--	25	Dom, S	(a).
D 115	13S, 4.1N, 8.5W	D. H. Hebler	--	1,000	Drl	145	6	80	do.	--	15	Dom	Supplies tourist camp.
D 116	13S, 2.9S, 3.0W	Hancock Water Co.	1945	1,000	Drl	166	8	--	Pleistocene sand and gravel	--	250	PS	Used to flow 60 gpm. (a).
D 117	13S, 3.4S, 2.8W	Edward Morgan	--	1,100	Drl	171	6	75	Upper Devonian bedrock	--	15	Dom	Bedrock reported as "soapstone" is possibly in crushed zone in fault.
D 118	13S, 3.7S, 1.3W	William Shultz	--	910	Drl	75	6	40	Upper Devonian sandstone	--	40	Dom	
D 119	13S, 6.6S, 1.1E	Edward Merwin	--	1,540	Drl	205	6	110	do.	--	20	Dom	
D 120	13S, 3.3S, 2.4W	Ranburg & Carr	1938	920	Drl	185	6	70	do.	--	--	Dom	Flowed when drilled. (a).
D 121	13S, 3.5S, 2.2W	Consumers Dairy Co., Inc.	--	925	Drl	356	8	212	do.	--	100	Ind	
D 122	13S, 3.3S, 2.0W	Frank Wolsey	1945	920	Drl	309	6	176	Upper Devonian sandstone and shale	7	60	Dom	Supplies 75 people.
D 123	13S, 4.0S, 1.2W	Harold Gunster	1945	910	Drl	175	6	90	Upper Devonian red shale and gray sandstone and shale	--	10	Dom	(b).
D 124	13S, 6.2S, 3.6E	Philo Bass (Camp Deerhead)	--	1,500	Drl	18	6	6	Upper Devonian sandstone	--	50	Dom	
D 125	13S, 5.6S, 3.2E	do.	--	1,640	Drl	220	4	150	do.	--	20	Dom	
D 126	13S, 6.1S, 3.4E	do.	--	1,490	Drl	340	6	60	do.	--	--	Dom	Flowed 5 gpm when drilled.
D 127	13S, 7.0S, 2.7E	Brown	--	1,560	Drl	202	6	10	do.	--	20	Dom	
D 128	13S, 7.2S, 0.9W	Penney and Wright	--	890	Drl	240	6	10	do.	--	25	Dom	
D 130	13T, 1.0S, 5.7W	James Space	--	1,100	Drl	170	6	70	do.	--	20	Dom	
D 131	13T, 0.7S, 6.2W	Green	--	1,100	Drl	80	6	--	Pleistocene sand and gravel	--	10	Dom	
D 132	13T, 2.6S, 0.2E	John Saddle	--	1,200	Drl	40	6	--	do.	--	30	Dom	
D 133	13T, 2.4S, 0.5W	G. I. Tryz Acid Factory	--	1,140	Drl	208	6	100	Upper Devonian sandstone	10	20	Ind	Used to flow 30 gpm.

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 134	13T, 3.5S, 1.0E	Cooks Falls Lodge	1945	1,200	Drl	220	6	100	Upper Devonian sandstone	--	--	Dom	Used to flow 20 gpm.
D 135	12S, 3.7N, 3.4W	J. W. Young	1902	1,120	Drl	210	5	125	Upper Devonian bedrock	40	15	Dom, F	
D 136	12S, 4.2N, 0.7W	Marcus Gager	1898	1,600	Drl	130	6	50	Upper Devonian sandstone	50	--	Dom, F	
D 137	11U, 3.7S, 8.5W	L. R. Frisbee	1900	1,240	Drl	65	5	--	Pleistocene sand	19	--	Dom, F	
D 138	12T, 8.0N, 3.7E	G. J. Yendes	1893	2,180	Drl	270	5 5/8	25	Upper Devonian bedrock	60	40	Dom, F	
D 139	12V, 7.2S, 6.0W	J. A. Morse	1901	1,400	Drl	74	6	15	Upper Devonian shale	20	45	Dom	
D 140	12U, 7.4S, 6.2E	Olney Smith	1902	1,360	Drl	70	6	30	do.	30	--	Dom	
D 141	11U, 3.7S, 2.7E	C. D. Nichols	1900	1,920	Drl	94	5	0	Upper Devonian bedrock	8	3	Dom, F	
D 142	12S, 4.4S, 6.5E	Milton Thomson	1944	1,360	Drl	250	10 to 6	67	do.	94	5	--	Principal water-bearing beds encountered at 215 ft. Diameter reduced at 67 ft.
D 143	12T, 3.9N, 6.4E	Ellsworth Bell	1944	1,380	Drl	29	6	23	do.	10	15	--	
D 150	12V, 6.2S, 0.3W	Belle Ayr Camp	--	1,980	Drl	250	--	60	do.	--	19	Dom	Pumped regularly for periods up to 10 hrs.
D 151	12U, 8.6N, 4.2E	Robert F. Cowan (Creamery)	1944	1,660	Drl	85	6	72	do.	--	15	Ind	
D 152	11U, 4.8S, 1.6E	B. & B. Dairy Co.	1944	1,620	Drl	77	6	--	Pleistocene sand and gravel	--	2	Ind	Flowed when drilled.
D 153	11U, 2.7S, 4.0W	A. Colston	1933	1,830	Drl	61	6	3	Upper Devonian bedrock	5	5	--	
D 154	11U, 2.7S, 4.2W	Adequetangie Club	1933	1,820	Drl	51	8 to 6	10	do.	2	10	--	
D 155	11U, 3.6S, 8.7W	Joseph Perry	1934	1,240	Drl	183	6	--	Pleistocene sand and gravel	16	8	--	(a).
D 156	12S, 4.4N, 7.7W	Scintilla Magneto Co.	1942	1,000	Drl	140	12	112	Upper Devonian red sandstone and shale	--	550	Ind	Average pumpage is 260,000 gpd.
D 157	12S, 6.5S, 7.5W	N. Y. State Dept. Conservation	1934	1,540	Dug	10	18	--	Pleistocene till	--	--	Obs	
D 158	11U, 1.7S, 3.9W	George Hillis	--	1,300	Drl	64	6	64	Pleistocene sand and gravel	30	25	Dom, S	
D 159	11U, 2.7S, 6.9W	Dewey E. Taylor	1938	1,300	Drl	170	6	68	Upper Devonian sandstone and shale	20	3	S	
D 160	12T, 7.5N, 2.0E	Michael Johnson	1900	2,100	Drl	285	6	10	do.	--	--	Dom, S	
D 161	12T, 8.5N, 3.0E	C. Grant	1946	1,840	Drl	130	6	25	Upper Devonian red shale and sandstone	24	3	Dom	
D 162	11U, 7.9S, 5.5W	George M. Henderson	1948	1,880	Drl	257	6	33	Upper Devonian red shale and gray sandstone	40	24	Dom, S	(b).
D 163	12T, 4.3N, 3.6E	Thomas Middlemast	1946	2,025	Drl	123	6	29	do.	23	25	F	
D 164	11U, 5.3S, 7.2W	William Balcom	--	1,390	Drl	83	6	--	Pleistocene sand and gravel	16	9	Dom	
D 165	12U, 4.6N, 5.4W	H. K. Adair	--	1,420	Drl	70	6	30	Upper Devonian red sandstone and shale	20	5	Dom	
D 166	12U, 8.0N, 6.1E	F. B. Sturgess	1946	1,805	Drl	145	6	45	Upper Devonian sandstone and shale	--	25	Dom	
D 167	12U, 8.3N, 2.8E	B. Nesbitt	1940	1,570	Drl	158	6	27	Upper Devonian red shale	70	5	Dom, S	

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 168	12U, 4.5S, 2.1W	Andes Cooperative Creamery	1946	1,600	Drl	32	6	--	Pleistocene sand and gravel	3	55	Ind	
D 170	12T, 8.7N, 2.5E	A. Shultis	1946	1,850	Drl	110	6	--	do.	23	15	Dom	
D 171	11U, 5.2S, 7.0W	O. Richardson	1940	1,380	Drl	175	6	20	Upper Devonian bedrock	--	--	Dom	Drilled in bottom of dug well. Flowed 16 gpm when drilled. Water has slight hydrogen sulfide odor.
D 172	12T, 6.9S, 3.2W	I. W. Ives	--	1,375	Drl	275	6	84	do.	80	7	Dom	Drawdown 20 ft after pumping for short time.
D 173	12T, 6.7S, 3.4W	Archie Allen	1943	1,250	Drl	83	6	83	Pleistocene sand and gravel	20	--	Dom, S	
D 174	12T, 6.8S, 4.3W	Florence Wakeman	1943	1,300	Drl	170	6	--	do.	110	--	Dom	
D 175	12S, 6.6S, 6.3E	Joseph F. Harby	1946	1,240	Drl	140	8	125	Upper Devonian gray sandstone	41	42	Dom, S	(b).
D 176	12S, 6.3S, 6.6E	Victor Hawver	--	1,300	Drl	150	6	40	Upper Devonian gray sandstone and red shale	--	--	Dom	
D 178	12S, 5.6S, 1.9E	Earl Jenkins	1948	1,790	Drl	95	6	90	Upper Devonian bedrock	--	10	Dom, S	Well flowed when drilled.
D 179	12S, 3.7S, 5.1E	Nick Zingaro	1946	1,620	Drl	98	5	58	do.	49	--	--	
D 180	12U, 5.0N, 0.3W	Richard Kirsh	--	1,975	Drl	216	6	100	Upper Devonian red shale and gray sandstone	80	3	S	
D 181	12U, 5.6N, 2.6W	McIntosh Slaughterhouse	1945	1,455	Drl	70	8	--	Pleistocene sand and gravel	24	110	Ind	Drawdown about 5 ft after pumping 110 gpm for 24 hrs. (a).
D 182	11U, 5.5S, 3.4W	Fanny Squire	1947	1,660	Drl	87	6	--	do.	6	4	Dom	
D 183	11U, 6.3S, 2.3W	Hegeman Dairy	1945	1,880	Drl	315	8	35	Upper Devonian gray sandstone	--	70	Ind	Pumped for periods up to 24 hrs.
D 184	12U, 6.2N, 0.5W	Henry Scofield	1945	1,500	Drl	164	6	40	do.	--	--	Dom	
D 185	12T, 0.3N, 5.7E	H. Moore	1946	1,460	Drl	138	6	25	Upper Devonian red sandstone and shale	65	7	Dom	
D 186	12T, 1.7S, 0.4W	Baker Brothers	1946	1,940	Drl	260	6	25	Upper Devonian gray sandstone	30	--	N	
D 187	12T, 6.7S, 4.7W	George Loveless	1948	1,260	Drl	60	6	--	Pleistocene sand and gravel	30	10	Dom	
D 188	13T, 5.3N, 1.5E	City of New York	1947	1,114	Drl	102	6	82	Upper Devonian gray sandstone	--	25	Dom	Supplies cafeteria.
D 189	13T, 5.6N, 1.3E	do.	1947	1,187	Drl	193	6	47	do.	--	15	N	Yield, 2 gpm at 134-ft depth; 20 gpm at 184-ft depth; and 30 gpm at 193-ft depth.
D 191	12T, 6.4N, 2.7W	Henry Weerheim	1947	1,540	Drl	50	6	20	Upper Devonian red sandstone	--	5	Dom, S	
D 192	12T, 6.7N, 2.4W	Clarence Huyck	1947	1,620	Drl	167	6	--	Upper Devonian red shale	50	10	Dom, S	
D 193	11T, 8.1S, 4.8W	Gilbert Wallette	--	1,290	Drl	76	6	30	Upper Devonian bedrock	12	5	S	
D 194	12S, 5.3N, 3.9E	Grace Walley	1942	1,260	Drl	172	6	168	do.	--	20	Dom	
D 195	12S, 6.8N, 2.2E	Henry Meyers	--	1,600	Drl	285	6	30	Upper Devonian red sandstone	6	50	Dom	
D 197	12S, 2.5N, 4.7E	Frank Sever	1947	2,020	Drl	254	6	130	Upper Devonian gray sandstone	150	9	S	
D 198	13T, 4.4N, 0.8W	Theodore Babcock	1948	1,120	Drv	15	1¼	--	Pleistocene sand and gravel	4	--	Dom, S	
D 200	13T, 4.6N, 0.8W	Leonard Fuller	1944	1,120	Drl	47	6	--	do.	23	4	Dom	Temperature 49°F, Oct. 28, 1948. (b).
D 202	13T, 3.0N, 3.5W	W. T. Downer	1941	1,060	Drv	18	1¼	--	do.	14	20	Dom	

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 203	13T, 2.7N, 3.4W	William Rose	1926	1,060	Drv	27	1¼	--	Pleistocene sand and gravel	23	35	Dom	
D 205	11T, 4.3S, 3.3E	O. Cerosaletti	1948	1,260	Drl	229	6	100	Upper Devonian bedrock	40	4	Dom, S	Temperature 47°F, Jan. 13, 1949.
D 206	12T, 4.0N, 6.5E	Floyd H. Mitchell	--	1,390	Drv	22	1¼	--	Pleistocene sand and gravel	--	4	Dom	
D 208	12T, 3.7N, 6.5E	Lewis Jersic	1947	1,385	Drl	126	6	110	Upper Devonian red shale	25	6	Dom	
D 209	12T, 3.6N, 6.3E	L. Maxim	1947	1,380	Drl	76	6	20	Upper Devonian gray sandstone	20	10	Dom	
D 210	12T, 6.7N, 4.0W	Southern New York Gas and Oil Co.	--	1,457	Drl	4,470	--	--	Upper Devonian to Middle Silurian bedrock	--	--	TB	Drilled for oil and gas. (b).
D 211	12S, 3.8S, 1.4W	Glenn Latourette	1945	1,230	Drv	18	1¾	--	Pleistocene sand and gravel	--	6	Dom	Temperature 50°F, Nov. 3, 1948.
D 215	12U, 5.3S, 3.5E	Howard Ruff	1943	1,740	Drl	480	6	3	Upper Devonian red and gray sandstones and shales	256	1	N	
D 216	12S, 0.5S, 6.5W	Ivan Wilson	1948	1,280	Drl	105	6	60	Upper Devonian gray shale	10	20	Dom, Com	Supplies 3 homes and automobile service station.
D 218	12S, 0.3S, 2.0E	James Teed	1947	2,060	Drl	160	6	80	Upper Devonian red and brown shales	140	15	Dom, S	
D 219	12T, 4.9S, 1.0W	Myron Coulter	1947	1,280	Drl	80	6	40	Upper Devonian gray sandstone and red shale	15	30	Dom, S	
D 220	12S, 0.3N, 2.3E	William Mathews	1948	2,020	Drl	164	6	30	Upper Devonian gray sandstone and shale	60	9	Dom, S	
D 222	12T, 0.5S, 1.4W	Douglas Tweetai	1948	2,100	Drl	180	6	25	Upper Devonian bedrock	80	4	Dom	
D 223	12T, 8.0N, 2.8E	Walter Halloway	1946	2,000	Drl	160	6	46	do.	58	12	Dom	Drilled in bottom of dug well.
D 224	12S, 3.7N, 2.2W	John McGill	1944	1,200	Drl	70	6	--	Pleistocene sand and gravel	Flows	80	Dom	Drawdown 12 ft after pumping 80 gpm for 2 hrs.
D 225	12S, 3.3N, 0.2E	L. E. Gray	1948	1,330	Drl	86	6	80	Upper Devonian red sandstone	12	--	Dom, S	Flowed 30 gpm when drilled. Drawdown about 10 ft after pumping 30 gpm for 1 hr. Temperature 47°F, May 20, 1949. (a), (b).
D 226	12S, 3.7N, 3.4W	H. Olson	1948	1,220	Drl	169	6	126	Upper Devonian gray sandstone and red shale	80	20	Dom	
D 227	12S, 4.3N, 7.8W	Scintilla Magneto Co.	1943	1,000	Drl	140	12	115	Upper Devonian shale	34	370	Ind	Drawdown 32 ft after pumping 725 gpm for several hrs. Temperature 47°F, Nov. 4, 1948. (a), (b).
D 228	12S, 1.2N, 7.7W	John Williams	1944	1,420	Drl	190	6	45	Upper Devonian gray bedrock	--	30	Dom, S	Temperature 47°F, Nov. 4, 1948.
D 236	12S, 2.8S, 7.6W	J. F. Hager	1942	1,840	Drl	159	5	14	do.	--	--	Dom, S	Temperature 50°F, Nov. 5, 1948.
D 237	12S, 9.0S, 4.8E	Ona Bowker	--	1,220	Drv	14	1¼	--	Pleistocene sand and gravel	--	--	Dom, S	
D 241	13S, 2.7S, 3.7E	John Gibson	--	980	Dug	15	36	--	do.	--	3	Dom	
D 243	12V, 8.2N, 0.1E	Charles Bartholemew	1944	1,420	Drl	132	6	--	Upper Devonian bedrock	Flows	4	Dom	Drilled in bottom of dug well. Static water level 10 ft above land surface.
D 244	12T, 3.0S, 1.7E	Ike Ford	1923	1,285	Drv	22	2½	--	Pleistocene sand and gravel	18	--	Dom	
D 250	12T, 8.2S, 5.1E	Arnold Finkle	1946	1,360	Drl	140	6 to 1¼	85	Upper Devonian sandstone	2	--	Dom, S	Diameter of casing reduced at 85 ft. Well flowed when drilled. Temperature 38°F, Nov. 4, 1948.
D 258	13U, 8.0N, 4.8W	H. J. Shaver	1944	1,470	Drl	145	6	60	do.	--	5	Dom, S	Nearby spring also used. Temperature 44°F, Nov. 4, 1948.

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 259	13U, 7.9N, 4.9W	J. Eckert	1948	1,520	Drl	242	6	20	Upper Devonian gray sandstone and red shale	142	--	Dom, S	Temperature 44°F, Nov. 4, 1948.
D 267	12V, 5.5S, 5.9W	Kass Inn Hotel	1948	1,350	Drl	75	6	16	Upper Devonian red sandstone	4	90	Dom	Pumped at 90 gpm for 8 hrs. Temperature 40°F, Nov. 5, 1948. Two other wells nearby (see D 489 and D 490). 6 springs on nearby hillside also used. Up to 160 guests supplied.
D 268	12U, 7.1S, 3.1E	J. Moratis	1929	1,470	Drv	24	1¼	--	Pleistocene sand and gravel	21	--	Dom	
D 269	12U, 6.9S, 3.2E	F. Trowbridge	--	1,460	Dug	12	48	--	do.	9	--	N	
D 270	12U, 4.8S, 3.9E	Helen C. Williman	1933	1,680	Drl	346	5	--	Upper Devonian bedrock	--	--	Dom	Water is cloudy. Temperature 54°F, Nov. 6, 1948. (a).
D 272	12U, 2.8S, 3.6E	Vogts Dairies	1946	1,660	Drl	143	8	61	Upper Devonian red sandstone and shale	2	150	Ind	Well has been pumped at 150 gpm for periods up to 48 hrs.
D 277	13U, 6.3N, 3.8E	H. Desilva	--	1,650	Dug	9	20	9	Pleistocene sand and gravel	7	--	Dom	Temperature 42°F, Nov. 8, 1948.
D 278	13U, 6.2N, 3.8E	W. C. McGown	--	1,660	Dug	10	20	--	do.	8	--	Dom	Temperature 45°F, Nov. 8, 1948.
D 280	12V, 2.4N, 3.0W	Betty Dlouhy	1948	1,730	Drl	108	6	70	Upper Devonian red shale	--	--	Dom	
D 281	12V, 4.8S, 1.8W	Joe Todd	1948	1,920	Drl	139	6	60	Upper Devonian gray sandstone and red shale	40	3	Dom	
D 283	12U, 2.7N, 6.4W	Wittaker	--	2,060	Dug	17	36	16	--	2	2	Dom	Well has furnished satisfactory supply over 35 yrs. Similar well nearby supplies stock.
D 285	13U, 3.3N, 3.5W	George Patterson	1935(?)	1,950	Drl	258	6	--	Upper Devonian sandstone	--	--	Dom	Temperature 42°F, Nov. 20, 1948.
D 288	13T, 6.0N, 3.2E	City of New York	1937	1,162	Drl	27	2½	7	--	--	--	TB	Flooded by Pepacton Reservoir. (b).
D 289	13U, 3.3N, 6.5W	do.	1937	1,744	Drl	51	2½	31	--	--	--	TB	(b).
D 290	13T, 1.7N, 3.7W	do.	1931	1,157	Drl	32	4	11	--	17	--	TB	(b).
D 291	13T, 3.3N, 1.0W	H. Calmer	--	1,110	Dug	14	24	--	Pleistocene sand and gravel	--	--	Dom	Well dry August 1948.
D 293	13T, 4.3N, 3.3W	Walter Niles	1933	1,185	Drv	18	1¼	--	do.	--	--	Dom	Temperature 46°F, Nov. 23, 1948.
D 295	12S, 6.5S, 5.8W	John Donowick	1948	1,380	Dug	6	36	--	do.	4	--	Dom	Temperature 45°F, Nov. 23, 1948.
D 296	12U, 0.1S, 4.5W	Mary Gabriel	1946	1,560	Drl	129	6	58	Upper Devonian red sandstone and shale	40	20	Dom, S	
D 297	12U, 4.4N, 5.5W	Walter Meigs	1946	1,400	Drl	115	6	102	Upper Devonian shale	26	6	--	
D 299	12S, 2.8S, 1.7E	Ray Storrer	--	1,640	Dug	15	24	--	Pleistocene till	12	3	Dom	Used only for household washing and laundering. Temperature 45°F, Dec. 8, 1948.
D 300	12S, 2.2S, 0.8E	Milton Thompson	--	1,960	Dug	14	24	--	do.	3	--	Dom	Temperature 45°F, Dec. 8, 1948.
D 301	12S, 1.5S, 0.7E	William Hodge	1948	1,740	Drl	187	6	168	Upper Devonian gray and red sandstone and red shale	128	5	S	
D 302	12T, 3.7S, 1.1E	Edward Aitkin	1947	1,320	Drl	209	6	50	Upper Devonian gray sandstone	45	40	Dom, S	
D 303	12S, 0.1S, 3.0E	Charles Williams	--	1,840	Dug	13	36	--	Recent alluvium and Pleistocene till	6	6	Dom	Temperature 48°F, Dec. 8, 1948.
D 305	12S, 1.3S, 4.2W	Edwin Young	1948	1,470	Drl	165	6	75	Upper Devonian gray shale	2	6	Dom	Temperature 38°F, Dec. 8, 1948. (b).

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 306	12S, 1.0S, 4.9W	Percy Stickle	1948	1,470	Dug	12	18	--	Pleistocene till	4	--	Dom	Temperature 42°F, Dec. 8, 1948.
D 308	13S, 7.7N, 2.8W	F. C. Spader	--	1,110	Dug	11	24	--	Pleistocene sand	3	8	Dom	Temperature 42°F, Dec. 10, 1948.
D 309	13S, 7.2N, 7.4W	Charles W. Sampson	--	1,080	Dug	24	30	--	do.	20	4	Dom	Temperature 45°F, Dec. 10, 1948.
D 310	12S, 9.0S, 7.9W	Milton Naff	--	1,180	Dug	32	24	--	do.	--	--	Dom, S	Do.
D 311	12S, 4.0S, 8.3W	Andrew Kelley	--	1,700	Dug	29	36	--	do.	12	--	Dom	Temperature 47°F, Dec. 10, 1948.
D 312	12S, 3.8S, 6.5W	S. Van Valkenburg	--	1,620	Dug	14	24	--	do.	4	--	N	Temperature 46°F, Dec. 10, 1948.
D 313	13S, 6.7N, 2.8E	Minnie Peake	--	1,180	Dug	16	24	--	do.	14	--	Dom	Temperature 47°F, Dec. 11, 1948.
D 314	13T, 1.8N, 6.2W	John Mavrode	--	1,030	Dug	16	16	--	do.	12	--	N	Temperature 49°F, Dec. 11, 1948.
D 316	11T, 5.8S, 4.1W	A. Hodgkiss	--	1,820	Dug	12	30	--	Pleistocene till	6	--	Dom	Temperature 43°F, Dec. 13, 1948.
D 318	11T, 5.8S, 2.8W	Claud Beverly	--	2,000	Dug	22	30	--	do.	12	--	N	Temperature 45°F, Dec. 13, 1948.
D 319	11T, 6.0S, 2.8W	R. B. Van Tassel	before 1900	2,010	Dug	14	36	--	do.	8	--	Dom	Do.
D 320	11T, 7.7S, 2.7W	D. Lewis	--	1,550	Dug	17	36	8	Upper Devonian sandstone	4	7	Dom	Flows at times during winter. Temperature 45°F, Dec. 13, 1948.
D 322	12S, 6.6N, 4.2E	Rockdale Creamery Corp.	1937	1,220	Drl	305	8	60	Upper Devonian sandstone and shale	40	40	Ind	Water contains hydrogen sulfide.
D 323	11T, 6.1S, 3.8W	John Ballings	1947	1,820	Drl	84	6	30	Upper Devonian red shale	15	6	Dom	Temperature 45°F, Dec. 14, 1948.
D 329	11T, 7.9S, 5.9W	Robert Drake	--	1,710	Dug	8	24	8	Pleistocene till	4	--	Dom	Temperature 46°F, Dec. 15, 1948.
D 330	12T, 3.5N, 6.4W	Frank Weidman	--	1,450	Dug	17	12	17	do.	10	--	Dom	Temperature 47°F, Dec. 15, 1948.
D 331	12T, 3.3N, 3.5W	Glenna Miller	--	2,100	Dug	15	12	15	do.	4	--	S	
D 334	11T, 4.4S, 3.2E	M. D. Packer	1938	1,270	Drl	127	8	--	Pleistocene sand and gravel	--	10	Dom	
D 335	11T, 4.6S, 2.9E	Josie R. Hoffman	1945	1,280	Drl	229	8	114	Upper Devonian sandstone and shale	43	1½	--	Drawdown 140 ft after bailing 1.5 gpm for 30 min.
D 336	12U, 6.6N, 2.0E	Dairymen's League	--	1,520	Drl	230	8	42	Upper Devonian bedrock	28	24	Ind	
D 337	12S, 8.1N, 6.5E	Edison Reid	1948	1,240	Drl	149	6	--	Pleistocene sand and gravel	15	6	Dom	(b).
D 338	11U, 1.1S, 1.8E	Raymond Champlin	1947	1,880	Drl	200	6	76	Upper Devonian bedrock	80	6	F	
D 339	11U, 5.9S, 6.0E	Allen C. Goss	1948	2,000	Drl	154	6	10	Upper Devonian red and gray shale	30	6	Dom	
D 340	12V, 6.3N, 0.3W	Earl Roe	1948	1,800	Drl	105	6	19	Upper Devonian gray sandstone and shale	20	5	Dom, F	
D 342	12V, 7.0S, 2.1W	George Korpela	1948	1,720	Drl	140	6	10	Upper Devonian red siltstone	40	8	Dom	
D 343	11T, 5.9S, 4.1W	Harry Powers	--	1,880	Drl	75	6	0	Upper Devonian bedrock	20	6	Dom	
D 344	12U, 2.6S, 3.6E	J. Faulkner	1948	1,670	Drl	103	6	59	Upper Devonian red sandstone	20	20	Dom	Has been pumped continuously for 3 hrs. Drilled well nearby, 98 ft deep.
D 345	11T, 5.6S, 3.7W	Sportsmens Club	--	1,850	Drl	116	6	16	Upper Devonian red shale	20	6	Dom	

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 346	12S, 8.3S, 5.8W	Sam Bonano	1948	1,270	Drl	106	6	--	Pleistocene sand and gravel	50	10	Dom, S	(b).
D 348	12V, 6.5N, 0.7E	Walter Raeder Estate	1932	1,740	Drl	101	6	2	Upper Devonian gray sandstone	2	10	Dom, S	
D 351	12S, 5.7S, 5.5E	Brown	--	1,270	Drl	167	6	90	Upper Devonian red sandstone	--	6	Dom	
D 352	12S, 1.1S, 1.4E	Clyde Smith	--	1,960	Drl	165	6	75	Upper Devonian gray, red, and brown sandstones	100	7	Dom, S	(b).
D 353	13S, 6.3N, 3.7W	Queens Farm Dairy	1948	1,040	Drl	296	10 to 8	125	Upper Devonian bedrock	32	120	Ind	Drawdown 106 ft after pumping 120 gpm for several hrs. Casing diameter reduced at 96 ft; water contains flammable gas.
D 356	12T, 8.5N, 4.5E	William Degenhardt	1948	2,260	Drl	136	6	60	Upper Devonian red shale	35	3	Dom	Temperature 46°F, Jan. 12, 1949. (b).
D 360	12T, 1.4N, 0.6E	Ralph Clarke	1947	1,590	Drl	100	6	75	Upper Devonian red shale and gray sandstone	32	5	Dom	Temperature 47°F, Jan. 15, 1949.
D 361	12T, 4.4N, 1.3W	Rolland Clarke	1919	2,095	Drl	82	6	30	Upper Devonian siltstone	--	15	Dom, S	Temperature 42°F, Jan. 15, 1949.
D 362	12S, 5.4N, 1.8E	Louis Ruling	--	1,240	Dug	16	18	--	Pleistocene till	6	--	N	Temperature 45°F, Jan. 15, 1949.
D 363	12S, 6.6N, 0.3W	Lynn Chambers	--	1,160	Dug	23	36	--	do.	1	--	Dom	Temperature 47°F, Jan. 15, 1949.
D 365	12S, 6.0N, 2.2W	V. Mathiasen	1938	1,020	Drv	18	1¼	--	Pleistocene sand and gravel	8	5	S	Another well on property for domestic use. Temperature 46°F, Jan. 15, 1949.
D 368	12T, 3.0N, 3.0E	Homer R. Mason	1913	2,060	Drl	110	8	30	Upper Devonian bedrock	27	--	Dom, S	Temperature 48°F, Jan. 16, 1949.
D 369	12T, 2.8N, 3.5E	M. Sanford	1946	1,740	Drl	241	6	54	Upper Devonian red shale and gray sandstone	95	20	Dom, S	Temperature 42°F, Jan. 16, 1949. (b).
D 370	12S, 1.7S, 3.0W	Bobik and Benna	1940	1,870	Drl	170	6	40	Upper Devonian brown sandstone and gray shale	40	30	Dom, S	
D 371	12S, 1.8S, 3.3W	Raymond Dean	--	1,720	Dug	35	30	--	Pleistocene till	3	3	Dom, S	Temperature 45°F, Jan. 17, 1949.
D 372	12S, 1.5S, 3.5W	V. LaMont	1948	1,640	Drl	160	6	135	Upper Devonian shale	60	20	Dom, S	Do.
D 373	13S, 7.7N, 1.2W	J. F. Knowl	1928	1,100	Dug	14	60	14	Pleistocene sand and gravel	8	6	Dom, S	Temperature 49°F, Jan. 17, 1949.
D 374	13S, 7.0N, 0.1W	Nelson Fraser	--	1,260	Dug	5	20	--	Pleistocene till	2	--	Dom	Temperature 41°F, Jan. 17, 1949.
D 377	13S, 2.0S, 0.8W	Wilson Harpur	1947	960	Drl	102	6	70	Upper Devonian gray sandstone	Flows	4	Dom	Static water level 0.5 ft above land surface. Temperature 46°F, Jan. 18, 1949.
D 378	13S, 1.0S, 4.1E	George McCarter	1946	1,000	Drl	196	6	132	do.	100	10	--	(b).
D 379	13S, 6.0S, 3.0E	Philo Bass	1949	1,620	Drl	242	6	156	Upper Devonian gray shale	100	20	Dom	
D 380	11T, 9.0S, 2.2W	William Murphy	1942	1,985	Drl	173	6	30	Upper Devonian red shale	100	10	Dom, S	
D 381	13T, 3.4S, 1.3E	George Tryz	1948	1,190	Drl	114	6	--	Pleistocene sand and gravel	3	40	Dom, Com	Supplies home and garage.
D 382	13T, 1.4S, 5.5W	Howard Kaufman	1948	1,040	Drl	245	6	204	Upper Devonian gray sandstone and red shale	100	20	Dom	(b).
D 383	13S, 8.4N, 1.8W	Sherman Stever	1946	1,120	Drl	148	6	94	Upper Devonian gray sandstone	18	35	Dom	(b).
D 384	13S, 3.0N, 8.3W	Nelson Stevens	--	1,040	Dug	22	36	--	Pleistocene sand and gravel	10	--	N	Temperature 45°F, Jan. 19, 1949.
D 386	13S, 0.7N, 6.7W	Ford Doolittle	1946	980	Drl	134	6	104	Upper Devonian sandstone and shale	18	6	Dom	Water contains hydrogen sulfide. Temperature 45°F, Jan. 19, 1949. (b).

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 387	13S, 0.6N, 6.9W	Bruno Anthomisen	1948	980	Drl	142	6	125	Upper Devonian gray sandstone	20	6	Dom	Water has a salty taste. Supplies hotel.
D 389	13S, 0.4N, 5.5W	John R. Pray	1946	960	Drl	86	6	80	Upper Devonian bedrock	Flows	--	Dom, Com	Flows 2 gpm; static water level 8 ft above land surface. Supplies home and garage. Temperature 45°F, Jan. 19, 1949.
D 391	13S, 2.7N, 5.9W	Silver Lake Assoc.	--	1,310	Drl	146	6	--	Pleistocene sand and gravel	12	35	Dom	Has been pumped at 35 gpm continuously for 4 hrs.
D 392	13S, 3.2N, 6.4W	Bradford Pelkap	--	1,530	Dug	8	24	--	do.	2	--	Dom	Temperature 42°F, Jan. 19, 1949.
D 393	13S, 3.6N, 7.1W	John P. O'Connor	--	1,650	Dug	18	27	--	Pleistocene till	8	--	Dom, S	Temperature 40°F, Jan. 19, 1949.
D 395	13T, 1.7S, 2.5W	Charles Conroy	1946	1,080	Drl	113	6	--	Pleistocene sand and gravel	4	--	Dom	(a).
D 396	12U, 4.8S, 1.0E	John Callabrese	1946	1,890	Drl	65	6	--	do.	--	30	Dom, S	
D 397	13S, 3.0S, 2.8W	Chancy Webster	1948	930	Drl	85	6	--	do.	40	10	Dom	Well flows after periods of heavy precipitation.
D 398	13S, 6.9S, 1.0E	Kathern Crandel	1945	1,540	Drl	182	6	30	Upper Devonian gray sandstone and shale and red shale	50	30	Dom, S	(b).
D 399	13S, 6.8N, 3.8W	Edward Martins	1945	1,060	Drl	95	6	--	Pleistocene sand and gravel	25	10	Dom, Com	Supplies home and automobile service station.
D 400	12T, 0.4S, 2.0E	Middletown Milk and Cream Co.	1948	1,325	Drl	50	12	--	do.	12	120	Ind	(b).
D 401	12T, 0.4S, 2.0E	do.	1948	1,325	Drl	41	6	--	do.	12	125	Ind	
D 402	12T, 0.4S, 2.0E	do.	1946	1,325	Drl	44	12	--	do.	12	300	Ind	Has been pumped for periods up to 140 hrs; average pumpage 120,000 gpd. (a).
D 403	13S, 6.3N, 3.7W	Harry Martin	1946	1,060	Drl	195	4	110	Upper Devonian gray shale	40	10	Dom	(b).
D 404	13S, 5.6N, 4.4W	Garegan	1946	1,060	Drl	148	6	60	do.	8	35	Dom, S	
D 406	13S, 4.7S, 3.3E	John Seibert	1946	1,640	Drl	198	6	140	Upper Devonian gray sandstone and shale	90	6	Dom, S	(b).
D 408	13S, 9.5S, 1.6E	Edmond Werner	1947	890	Drl	180	6	85	do.	40	10	Dom	(b).
D 409	12S, 1.9S, 0.1E	M. Higgly	1948	1,480	Drl	59	6	40	Upper Devonian gray sandstone	10	30	Dom, S	
D 410	12U, 2.2S, 5.3W	Walter Gray	1933	2,400	Drl	144	6	30	Upper Devonian gray sandstone and red shale	--	--	Dom, S	Temperature 47°F, Jan. 20, 1949.
D 411	12S, 0.6S, 0.8E	John Boyce	1945	1,620	Drl	75	6	30	Upper Devonian red sandstone	--	20	Dom, S	
D 412	12U, 1.4S, 4.2W	Akunsti Game Farm	1947	1,800	Drl	175	6	25	Upper Devonian gray sandstone	17	13	Dom, S	Temperature 44°F, Jan. 21, 1949.
D 414	12U, 2.5S, 4.5W	Harry Main	1948	2.040	Drl	152	6	6	Upper Devonian gray and red bedrock	127	15	Dom, S	
D 415	13T, 1.3N, 3.6W	Finnerty's Hotel	1948	1,100	Drl	150	6	120	Upper Devonian gray shale	18	35	Dom	
D 416	13S,10.3S, 5.9E	Long Eddy Water Co.	1948	920	Drl	153	8	--	Pleistocene sand and gravel	Flows	80	PS	Static water level 1 ft above land surface. Well supplies Long Eddy in Sullivan County. (a).
D 417	13S, 8.2S, 5.9E	Childs	1948	1,800	Drl	133	6	21	Upper Devonian gray sandstone and shale	30	7	--	Drilled from bottom of dug well.
D 418	13S, 8.0S, 0.6W	M. Smithers	1948	880	Drl	178	6	140	Upper Devonian gray shale	12	35	Dom	Owner reports 140 ft of water-bearing sand and gravel above gray shale.

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 419	13S, 2.8S, 2.2W	Evert Spry	--	1,020	Drl	128	6	60	Upper Devonian gray sandstone and red shale	30	3	Dom	
D 420	12T, 1.2N, 4.0E	Delaware County Farmers Coop.	1946	1,350	Drl	172	10	70	Upper Devonian red sandstone and shale	9	400	Ind	Water becomes cloudy and has hydrogen sulfide odor when heavily pumped. Temperature 49°F, Nov. 8, 1947. (a), (b).
D 421	12T, 1.2N, 4.0E	do.	1946	1,350	Drl	70	10	70	Pleistocene sand and gravel	16	150	Ind	Has been pumped at 150 gpm for 24 hrs. When pumped between 200 and 300 gpm for several hours, water level reached bottom of well. (a).
D 422	13S, 9.4S, 1.8E	M. Ratzler	1946	880	Drl	217	6	169	Upper Devonian red shale	110	10	Dom	(b).
D 423	12U, 1.3S, 1.7W	Tunis Lake Camp	1948	2,010	Drl	217	6	184	Upper Devonian gray sandstone	90	12	Dom	Supplies boys' camp during summer.
D 424	12U, 3.4S, 3.5W	Andrew Cass	1932	1,560	Drv	15	1¼	--	Pleistocene sand and gravel	8	4	Dom	Temperature 40°F, Jan. 20, 1949.
D 425	12U, 3.8S, 5.8W	Perry Warren	1945	2,020	Dug	10	36	--	do.	.5	7	Dom	Flowed 1 gpm when dug. Temperature 43°F, Jan. 20, 1949.
D 426	12S, 6.1N, 1.0E	East Sidney Dam	--	1,169	Drl	115	2	76	Upper Devonian gray and red sandstone and shale	--	--	TB	Drilled by U.S. Army Corps of Engineers between 1938 and 1945 to determine dam site. (b).
D 427	12S, 5.5N, 1.0E	do.	--	1,232	Drl	92	2	16	do.	--	--	TB	Do.
D 428	12S, 6.0N, 1.3E	do.	--	1,118	Drl	67	2	20	do.	--	--	TB	Do.
D 430	11T, 3.7S, 3.8E	Pine Lake Camp	1948	1,240	Drl	60	5 5/8	--	Pleistocene sand and gravel	20	8	Dom	
D 431	12V, 2.8S, 2.4W	Arthur Stanton	1948	1,980	Drl	86	5 5/8	12	Upper Devonian red sandstone	6	20	Dom	
D 433	13T, 2.3S, 4.8E	E. T. Banks	--	1,350	Drv	17	1¼	--	Pleistocene sand and gravel	10	15	Dom	
D 434	11T, 6.3S, 3.8W	Theodore Demytt	1948	1,770	Drl	225	6	32	Upper Devonian bedrock	120	10	Dom	
D 435	12V, 7.3S, 2.3W	Chriss Martens	1946	1,740	Drl	125	6	85	Upper Devonian gray sandstone	20	2	Dom	
D 436	12V, 7.3S, 6.4W	Arkville Water District	1929	1,350	Drl	80	6	--	Pleistocene sand and gravel	6	--	PS	
D 437	12V, 6.3S, 3.1W	William Greene	1947	1,500	Drl	60	6	28	Upper Devonian red shale	12	20	Dom, Com	Supplies greenhouse.
D 438	12V, 4.7S, 4.9W	J. H. Stoutenburg	1945	1,390	Drl	54	6	--	Pleistocene sand and gravel	12	12	Dom	
D 439	12V, 3.9S, 4.0W	Herbert Raeder	1944	1,520	Drl	144	6	30	Upper Devonian gray sandstone and red shale	2	30	S	
D 440	12V, 3.7S, 4.2W	Harold Raeder	1945	1,580	Drl	103	6	11	do.	18	3	Dom	
D 441	12V, 4.0S, 4.2W	Francis Caswell	1945	1,515	Drl	100	6	20	Upper Devonian bedrock	20	20	Dom	
D 442	12V, 1.1S, 3.8W	Henry Morse	1946	1,880	Drl	143	6	35	Upper Devonian gray sandstone	45	5	Dom	
D 443	12V, 2.8S, 3.6W	John Snipas	1935	1,625	Drl	48	6	35	Upper Devonian red shale	7	5	Dom, Com	Supplies automobile service station.
D 444	12U, 5.9S, 4.3E	Dalton Sanford	1944	1,920	Drl	252	6	120	Upper Devonian red shale and gray sandstone	150	10	Dom, S	
D 445	12U, 4.6S, 4.7E	Orvil Rosa	1936	2,140	Drl	160	6	--	Upper Devonian bedrock	30	3	Dom	
D 446	12U, 4.8S, 6.0E	Adams	1945	1,830	Drl	310	6	0	Upper Devonian shale and sandstone	76	13	Dom, S	

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 447	12V, 3.8S, 5.9W	Marshal Adee	1946	1,850	Drl	210	6	90	Upper Devonian gray sandstone	65	6	Dom, S	
D 448	12V, 0.7S, 3.3W	Harold Gray	1946	1,890	Drl	263	6	8	Upper Devonian gray sandstone and red shale	60	8	Dom, S	
D 449	12V, 0.2S, 1.7W	Eber Cartwright	1944	1,800	Drl	62	6	--	Pleistocene sand and gravel	8	30	Dom	
D 450	12V, 0.9N, 1.8W	Grant Slausen	1944	1,980	Drl	83	6	14	Upper Devonian red sandstone and shale	28	5	Dom	
D 451	12V, 0.8N, 1.0W	George Lawrence	--	1,880	Drl	80	6	--	Pleistocene sand and gravel	6	12	Dom, S	
D 453	12V, 0.8N, 5.3W	Melvin German	1944	1,540	Drl	75	6	15	Upper Devonian red sandstone	37	4	Dom	
D 454	11U, 0.1S, 1.8E	M. Weaver	1946	2,060	Drl	162	6	35	Upper Devonian sandstone and shale	28	6	Dom	
D 455	12V, 1.4N, 6.0W	W. H. Hinkley	1949	1,840	Drl	182	6	45	do.	145	5	F	
D 456	12V, 2.7N, 4.7W	Al Pekrul	1938	1,920	Drl	160	6	20	Upper Devonian red shale and sandstone	30	4	Dom	
D 457	12V, 6.2N, 0.6E	Walter Raeder Estate	1934	1,800	Drl	143	6	6	Upper Devonian gray sandstone	40	6	N	
D 458	12U, 1.1N, 1.4E	W. B. Wilson	--	1,860	Dug	26	36	--	Pleistocene sand and gravel	14	3	Dom	Temperature 44°F, Feb. 17, 1949.
D 462	12U, 6.3N, 2.5E	George Richardson	1944	1,860	Drl	103	6	20	Upper Devonian bedrock	40	8	Dom, S	
D 464	11U, 4.7S, 3.5E	Charles D. Simmons	1944	1,730	Drl	147	6	90	do.	35	--	Dom, Com	Water is very turbid. Temperature 47°F, Feb. 19, 1949. Supplies automobile service station.
D 469	11U, 2.2S, 3.2E	Donald Van Dusen	1938	1,615	Drl	160	6	18	do.	16	20	Dom, S	
D 471	11U, 0.4S, 2.8E	Clarence Roe	1947	1,910	Drl	122	6	80	Upper Devonian red shale	40	8	Dom, S	
D 472	11U, 0.1S, 2.3E	Ernest Guntert	1945	2,040	Drl	160	6	27	Upper Devonian gray sandstone and shale and red shale	90	4	Dom, S	Temperature 45°F, Feb. 22, 1949.
D 473	11U, 0.8S, 2.5E	William Boerder	1948	1,845	Drl	110	6	28	Upper Devonian gray shale	Flows	--	Dom, F	Flows 3 gpm. Temperature 45°F, Feb. 22, 1949.
D 474	11U, 1.3S, 1.2E	Frederick Mertz	1926	1,950	Drl	95	5	33	do.	50	6	Dom, S	Temperature 44°F, Feb. 22, 1949.
D 475	11U, 1.9S, 0.6E	Frank Rossback	1946	1,760	Drl	107	6	34	Upper Devonian red shale and sandstone	32	7	Dom, S	
D 476	12U, 7.3N, 2.6E	South Kortright Central School	1939	1,550	Drl	313	6	64	Upper Devonian red and gray sandstone and shale	22	23	Dom	Water chlorinated; average consumption 10,000 gpd. Temperature 46°F, Feb. 23, 1949. (a), (b).
D 477	12V, 8.5N, 4.6W	W. E. Decker	--	2,075	Dug	30	30	--	Pleistocene sand and gravel	21	--	Dom, S	Temperature 45°F, Feb. 22, 1949.
D 478	12V, 5.7N, 2.7E	C. Rickard	1916	1,260	Drl	190	2	--	Upper Devonian bedrock	--	--	Dom	Originally drilled for New York City Board of Water Supply to determine dam site. Static water level 18 ft above land surface.
D 482	13S, 7.1N, 3.7W	Sheldon Budine	1948	1,080	Drl	90	6	--	Pleistocene sand and gravel	27	30	Dom	(a), (b).
D 483	13S, 6.8N, 3.8W	Horace Brown	1947	1,080	Drl	55	6	--	do.	15	6	Dom	
D 484	13S, 6.7N, 3.5W	Patrick Rathbone	1948	1,080	Drl	65	6	--	do.	20	30	Dom	
D 485	12S, 0.7S, 6.4W	Ray Carlson	1947	1,320	Drl	120	6	28	Upper Devonian gray sandstone	Flows	4	Dom	Flows 1 gpm.
D 486	12S, 0.9N, 7.7W	Marshal Hughes	1948	1,360	Drl	116	6	50	Upper Devonian shale	--	6	Dom	

Table 5.--Records of representative wells in Delaware County (Continued)

Well number	Location	Owner or tenant	Year completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Principal water-bearing material	Water level below land surface (feet)	Yield (gpm)	Use	Remarks
D 487	12S, 4.3N, 7.8W	Scintilla Magneto Co.	1942	1,000	Drl	140	6	112	Upper Devonian red sandstone and shale	31	360	TW	Drawdown 49 ft after pumping 360 gpm for 60 hrs. (a), (b).
D 488	13T, 2.9S, 0.5E	Charles M. Allen Excelsior Co., Inc.	1956	1,170	Drl	140	6	40	Upper Devonian bedrock	Flows	10	Ind	Drawdown 20 ft after pumping 10 gpm for 6 hrs.
D 489	12V, 5.5S, 5.9W	Kass Inn Hotel	1948	1,350	Drl	130	6	70	do.	9	20	Dom	Water contains hydrogen sulfide. Used only for "sulphur" baths in hotel.
D 490	12V, 5.5S, 5.9W	do.	1956	1,350	Drl	70	6	35	do.	Flows	20	Dom	Part of supply system for hotel. See also wells D 267 and D 489. Slight hydrogen sulfide odor in water when well is pumped for long periods. Water level about 2 ft above land surface.
D 491	12V, 5.9S, 1.1W	Majestic Hotel	1957	1,600	Drl	230	6	25	do.	--	--	Dom	Supplies hotel, capacity 85 guests.

Table 6.--Drillers' logs of selected wells and test holes, Delaware County
Notations in parentheses are comments of the author

	Thickness (feet)	Depth (feet)
D 21; 11T, 4.1S, 3.9E; drilled by Wm. Stothoff Co., Inc., 1939; altitude 1,220 feet.		
Top soil, sand, gravel, and rock (boulders?)	31	31
Hardpan and clay	20	51
Clay, mucky	15	66
Quicksand	33	99
Rock, gray (boulders?) and gravel	17	116
Hardpan	60	176
Rock, gray	100	276
D 46; 11U, 6.9S, 6.4E; drilled by George Birge, 1932; altitude 1,770 feet.		
Sand, gravel, and hardpan	20	20
Shale, red	42	62
D 52; 12V, 77N, 0.8W; drilled by Wm. Stothoff Co., Inc., 1932; altitude 1,580 feet.		
Boulders	7	7
Boulders and hardpan	9	16
Boulders	60	76
Rock, red	9	85
Rock, gray	15	100
Rock, red and gray	20	120
Rock, red	22	142
Rock, gray	17	159
Rock, red	44	203
Rock, blue and red	31	234
Rock, red	118	352
Granite (conglomerate?)	7	359
Rock, blue	22	381
Granite (conglomerate?) gray	62	443
Rock, blue	81	524
Rock, gray	19	543
Rock, blue	43	586
Rock, red, blue, and gray	5	591
Rock, gray	9	600
D 59; 12V, 8.2N, 0.7E; drilled by Van Loan, altitude 1,400 feet.		
Sand, gravel, and hardpan	90	90
Sandstone, red, and some shale	50	140

Table 6.--Drillers' logs of selected wells and test holes, Delaware County (continued)

	Thickness (feet)	Depth (feet)
D 78; 12U, 7.3S, 6.0E; drilled by Van Loan; altitude 1,360 feet.		
Soil and hardpan	13	13
Sandstone, blue	60	73
Sandstone, red	30	103
Sandstone, gray	83	186
D 100; 12S, 5.3S, 5.9E; drilled by Wm. Stothoff Co., Inc., altitude 1,220 feet.		
Fill, ashes	2	2
Sand, yellow, and loam	3	5
Sand, gravel, and clay	20	25
Clay, red	18	43
Hardpan and gravel	13	56
Hardpan and gravel with large fragments	10	66
Sandstone, gray	158	224
D 102; 12 S, 5.9S, 5.8E; drilled by Wm. Stothoff Co., Inc., 1940; altitude 1,220 feet.		
Stone and clay	20	20
Clay, sandy	40	60
Clay, fine	12	72
Hardpan	42	114
Sandstone, gray	306	420
D112; 13S, 5.3N, 7.4W: driller not known, 1945; altitude 940 feet.		
Loam and fine gravel	25	25
Sand, very fine	110	135
Sandstone, gray, dense, very hard	22	157
D123; 13S, 4.0S, 1.2W; drilled by Tully, 1945; altitude 910 feet.		
Gravel	90	90
Shale, red	15	105
Sandstone, blue	60	165
Shale, gray	10	175

Table 6.--Drillers' logs of selected wells and test holes, Delaware County (continued)

	Thickness (feet)	Depth (feet)
D 162; 11U, 7.9S, 5.5W; drilled by Van Loan, 1948; altitude 1,880 feet.		
Gravel	10	10
Hardpan	23	33
Shale, red	40	73
Sandstone, gray, with interbedded red shale	184	257
D 175; 12S, 6.6S, 6.3E; drilled by Hall & Co., 1946; altitude 1,240 feet.		
Gravel	17	17
Sand, some water	70	87
Clay	38	125
Sandstone, gray, water	15	140
D 200; 13T, 4.6N, 0.8W; drilled by Van Loan, 1944; altitude 1,120 feet.		
Soil and hardpan	15	15
Quicksand	20	35
Gravel, hard, 4 gpm	12	47
D 210; 12T, 6.7N, 4.0W; driller not known; year not known; altitude 1,457 feet. Log is quoted as furnished by State Geologist of New York.		
No sample	200	200
Kiskatom	425	625
Ashokan sand, shale, and flags	637	1,262
Mt. Marion shale and sands	1,557	2,819
Stony Hollow sand	35	2,854
Bakoven shale	784	3,638
Onondaga limestone and chert	96	3,734
Schoharie limestone	31	3,765
Esopus shale	59	3,824
Oriskany sand to slate, some gas	22	3,846
Helderberg limestone	16	3,862
No sample	274	4,136
Manlius-Bertie	59	4,195
Camillus dolomite and anhydrite	106	4,301
Vernon red and green shale, anhydrite, some dolomite below 4,415 feet, some gas	151	4,452
Lockport	18	4,470

Table 6.--Drillers' logs of selected wells and test holes, Delaware County (continued)

	Thickness (feet)	Depth (feet)
D 225; 12S, 3.3N, 0.2E; drilled by Roy Myers, 1948; altitude 1,330 feet.		
Gravel, coarse	15	15
Clay and hardpan	10	25
Clay, gray-blue	55	80
Sandstone, red	6	86
D 288; 13T, 6.0N, 3.2E; drilled by Harlan and Plunkett, 1937; altitude 1,162 feet.		
Sand, small boulders, and small amount of clay	7	7
Sandstone, gray	13	20
Shale	6	26
Sandstone, gray	1	127
D 289; 13U, 3.3N, 6.5W; drilled by Harlan and Plunkett, 1937; altitude 1,744 feet.		
Clay, rock flour, sand, cobbles, boulders, and small stones	31	31
Sandstone, medium-grained, gray	9	40
Shale, blue	1	41
Sandstone, medium-grained, gray	7	48
Shale, blue	3	51
D 290; 13T, 1.7N, 3.7W; drilled by P. Kelly, 1931; altitude 1,157 feet.		
Topsoil, boulders, and rock fragments	11	11
Sandstone, fine-grained, blue-gray; some shaly sandstone	21	32
D 305; 12S, 1.3S, 4.2W; drilled by Butcher Bros., 1948; altitude 1,470 feet.		
Sand	30	30
Clay	35	65
Sand and gravel	10	75
Shale, gray	90	165
D 337; 12S, 8.1N, 6.5E; drilled by Jack Reynolds, 1948; altitude 1,240 feet.		
Hardpan	20	20
Gravel	10	30
Sand	38	68
Clay	4	72
Sand	77	149

Table 6.--Drillers' logs of selected wells and test holes, Delaware County (continued)

	Thickness (feet)	Depth (feet)
D 346; 12S, 8.3S, 5.8W; drilled by Butcher Bros., 1948; altitude 1,270 feet.		
Sand, gravel, and hardpan	90	90
Shale (hard clay?)	1	91
Sand and gravel	9	100
Shale (hard clay?)	2	102
Sand and gravel	4	106
D 352; 12S, 1.1S, 1.4E; drilled by Butcher Bros., altitude 1,960 feet.		
Sand and gravel	75	75
Sandstone, gray	10	85
Sandstone, red	10	95
Sandstone, gray	60	155
Sandstone, brown	10	165
D 356; 12T, 8.5N, 4.5E; drilled by Jack Reynolds, 1948; altitude 2,260 feet.		
Hardpan	10	10
Sand	20	30
Hardpan	20	50
Clay	10	60
Shale, soft, red	76	136
D 369; 12T, 2.8N, 3.5E; drilled by Tully, 1946; altitude 1,740 feet.		
Soil, gravel, and hardpan	54	54
Shale, red	96	150
Shale, gray; 1 gpm	41	191
Shale, red, 9 gpm	50	241
D 378; 13S, 1.0S, 4.1E; drilled by Tully, 1946; altitude 1,000 feet.		
Hardpan	10	10
Clay	70	80
Sand and gravel	52	132
Sandstone, gray	64	196

Table 6.--Drillers' logs of selected wells and test holes, Delaware County (continued)

	Thickness (feet)	Depth (feet)
D 382; 13T, 1.4S, 5.5W; drilled by Tully, 1948; altitude 1,040 feet.		
Clay, hardpan, and gravel	150	150
Gravel and sand	54	204
Sandstone, shaly, brown	41	245
D 383; 13S, 8.4N, 1.8W; drilled by Tully, 1946; altitude 1,120 feet.		
Gravel	10	10
Clay	84	94
Sandstone	5	99
Shale, red	45	144
Sandstone, gray	4	148
D 386; 13S, 0.7N, 6.7W; drilled by Butcher Bros., 1946; altitude 980 feet.		
Soil and hardpan	43	43
Sand, water	20	63
Hardpan	7	70
Sand, coarse, and gravel	34	104
Sandstone	20	124
Shale	10	134
D 398; 13S, 6.9S, 1.0E; drilled by Tully, 1945; altitude 1,540 feet.		
Hardpan	30	30
Sandstone, gray	75	105
Shale, red	20	125
Shale, gray	57	182
D 400; 12T, 0.4S, 2.0E; drilled by Tully, 1948; altitude 1,325 feet.		
Soil, clay, and boulders	20	20
Gravel, little water	5	25
Clay, red	10	35
Sand, fine, and gravel	5	40
Gravel, medium	10	50

Table 6.--Drillers' logs of selected wells and test holes, Delaware County
(continued)

	Thickness (feet)	Depth (feet)
D 403; 13S, 6.3N, 3.7W; drilled by Tully, 1946; altitude 1,060 feet.		
Sand and gravel	100	100
Quicksand	10	110
Shale, gray	85	195
D 406; 13S, 4.7S, 3.3E; drilled by Tully, 1946; altitude 1,640 feet.		
Hardpan	140	140
Sandstone, gray	48	188
Shale, gray	10	198
D 408; 13S, 9.5S, 1.6E; drilled by Tully, 1947; altitude 890 feet.		
Gravel	85	85
Sandstone, gray	85	170
Shale, gray	10	180
D 420; 12T, 1.2N, 4.0E; drilled by Tully, 1946; altitude 1,350 feet.		
Sand, gravel, and a little clay	70	70
Sandstone and shale, interbedded	102	172
D 422; 13S, 9.4S, 1.8E; drilled by Tully, 1946; altitude 880 feet.		
Gravel	20	20
Hardpan	149	169
Shale, red	48	217
D 426; 12S, 6.1N, 1.0E; drilled by U.S. Army, Corps of Engineers, between 1938 and 1945; altitude 1,169 feet.		
Topsoil	1	1
Silt, a little clay and sand	3	4
Silt, sandy, and trace of clay	3	7
Silt, sand and gravel, and a little clay	17	24
Silt, sandy, a little clay and gravel	3	27
Silt, clayey, and a little sand; some boulders at bottom	30	57
Sand, silt, some gravel, and a trace of clay	19	76
Sandstone, medium- to coarse-grained, soft to hard, gray	14	90
Shale, silty, soft, gray	1	91
Shale, hard, red	4	95
Sandstone, very fine-grained, hard, red	6	101
Shale, clayey, soft to medium, hard, red	12	113
Sandstone, very fine-grained, hard, red	2	115

Table 6.--Drillers' logs of selected wells and test holes, Delaware County (continued)

	Thickness (feet)	Depth (feet)
D 427; 12S, 5.5N, 1.0E; drilled by U.S. Army, Corps of Engineers, between 1938 and 1945; altitude 1,232 feet.		
Sand, gravel, some silt, and a trace of clay.....	3	3
Gravel, some sand and silt, and a trace of clay.....	8	11
Sand, some gravel and silt, and a trace of clay.....	6	17
Sandstone, coarse-grained, hard, gray.....	12	29
Shale, grayish-green.....	1	30
Shale, silty to sandy, red.....	60	90
Sandstone, hard, red.....	2	92
D 428; 12S, 6.0N, 1.3E; drilled by U.S. Army, Corps of Engineers, between 1938 and 1945; altitude 1,118 feet.		
Topsoil, silt, and trace of sand.....	1	1
Gravel, silty, and traces of sand and clay.....	4	5
Gravel, silty, a little sand, trace of clay, numerous boulders at bottom.....	15	20
Sandstone, fine to medium-grained, gray.....	10	30
Shale, soft, greenish-gray to light-gray.....	2	32
Shale, soft, red.....	3	35
Sandstone, fine-grained, hard, red.....	9	44
Shale, hard, red.....	2	46
Sandstone, very fine-grained, hard, red.....	6	52
Shale, silty, hard, red.....	13	65
Sandstone, very fine-grained, hard, gray.....	2	67
D 476; 12U, 7.3N, 2.6E; driller not known; 1939; altitude 1,550 feet.		
Not known.....	8	8
Gravel.....	15	23
Clay, red.....	27	50
Sand, fine, black.....	14	64
Rock, hard, red.....	87	151
Rock, red.....	55	206
Rock, red, changing to gray, 12.5 gpm.....	33	239
Rock, red.....	20	259
Rock, red, and gray, 16 gpm.....	29	288
Rock red and gray, 23 gpm.....	25	313
D 482; 13S, 7.1N, 3.7W; drilled by R. J. Myers; 1948; altitude 1,080 feet.		
Gravel.....	20	20
Quicksand.....	20	40
Sand.....	40	80
Gravel, 30 gpm.....	10	90

Table 6.--Drillers' logs of selected wells and test holes, Delaware County
(continued)

	Thickness (feet)	Depth (feet)
D 487; 12S, 4.3N, 7.8W; drilled by Raymond Gordon, 1942; altitude 1,000 feet.		
Topsoil, sand, and gravel	20	20
Clay, mixed with stones at top	80	100
Hardpan, red	12	112
Shale, soft, closely jointed, red	8	120
Sandstone, red	10	130
Shale, red	10	140